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SUMMARY OF RECENT ABSTRACTS*

VIII. TYPHUS GROUP OF FEVERS †

General

The special issue of the *Arch. Inst. Pasteur de Tunis* for December 1959 (p. 574), which commemorates the 50th anniversary of the discovery by Nicolle of the transmission of epidemic typhus by the louse, contains a large number of papers on the rickettsiae and the various rickettsial diseases. These can hardly be abstracted further; many are themselves summaries of knowledge, and some record extensions of previous work. In general the authors are well known in this field, and the papers should be read in full.

FOLIGUET (p. 1154) found agglutinins (at titres of 1 in 20 to 1 in 80) for *R. prowazeki* and *R. mooseri* in 42 and 22 of 100 French soldiers who had never received an antirickettsial vaccine and had no history of rickettsial disease. Response to subsequent immunization with rickettsial vaccine was greater in those showing these agglutinins than in others; titres fell after one year.

Rickettsial infections are to be found in the Sudan, but KIRK (p. 358) states that reports indicate that they are uncommon. From the evidence of micro-agglutination tests on patients with atypical pneumonia, and of intradermal tests on adult males of the general population, EYCKMANS and TRIEST (p. 1154) conclude that infections with *R. prowazeki* and *R. burneti*, and to a lesser extent *R. mooseri*, are prevalent in the lower Congo region. KALRA (p. 234) reviews the present state of rickettsial diseases in India, where almost all forms are found in different parts.

SMADEL (p. 111) estimates that about 1,000 persons contract rickettsial infections each year in the United States, and notes that the cycles of infections which exist in arthropods and animals make control difficult. Epidemiological features are suburban development in areas endemic for spotted fever, and the movement of cattle and animal products from Q fever areas. Hedgehogs in

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1960, v. 57. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on the typhus group of fevers in this series, see the October issues of the *Tropical Diseases Bulletin* each year since 1939.

France have been found to contain antibodies to various rickettsiae, at low titres, and GIROUD *et al.* (p. 1045) suggest that they may act as reservoirs, and may be connected with rickettsial diseases of cattle and sheep.

MEL'NIKOV (p. 1040) has found that at titres above 1 in 250 the haemagglutination test with antigens from the relevant rickettsiae is effective for diagnosis of the typhus and tick-borne spotted fevers.

WEISS and DRESSLER (p. 1038) estimate that infection of tissue cultures of chick embryo entodermal cells with *R. prowazeki, R. burneti,* psittacosis virus and trachoma virus, is very greatly enhanced by centrifugation at 1,600–1,800 g for 1 hour at 20°C. after the addition of the infecting organisms.

Proteus OX19 Type. Vectors: Louse and Flea

Typhus still occurs in Mexico, and serological examinations in patients suspected of the disease indicate a preponderance of *R. prowazeki* infection over *R. mooseri* infection; certain provinces appear to provide most of the cases (VARELA and ROCH, p. 23).

ČERVENKA *et al.* (p. 1036) report an outbreak of typhus in gypsies in Czechoslovakia, which apparently originated from a patient suffering from a mild illness but who had had a disease diagnosed as Brill's disease 4 years previously. The community was infested by lice, and the outbreak was controlled by treatment and the enforcement of public health measures. POSPÍŠIL *et al.* (p. 1156) in Czechslovakia found the complement-fixation test positive in Brill's disease, but the Weil-Felix reaction negative or feeble; the former is the method of choice, and is important in detecting Brill's disease, which may give rise to outbreaks of classical typhus in suitable surroundings. A case of Brill's disease, in a Polish immigrant, is reported from Australia by TONGE (p. 462).

In experiments with lice fed at various times on patients with typhus KRASNIK (p. 1037) showed that most infections of the lice occurred on the 6th and 7th days of the disease; none occurred after the 8th day, by which time antibodies could be detected in the sera of the patients. By using highly sensitive methods of detecting rickettsiae (*e.g.* by feeding louse larvae on test material) PSHENICHNOV *et al.* (p. 1037) recovered *R. prowazeki* from the air of a box in which infected lice were being fed, from normal lice which could only have been infected from air or dust, and from ectoparasites of infected guineapigs. They point out the importance of such routes of infection in experimental work.

BOVARNICK and SCHNEIDER (p. 1038) discuss the incorporation of glycine by typhus rickettsiae; the paper should be read in full.

IGNATOVICH (p. 1155) describes the loss of infectivity which occurred in yolk sac preparations of *R. prowazeki* and *R. mooseri* diluted in various media and freeze-dried.

A soluble antigen was obtained from formalin-inactivated suspensions of yolk sacs infected with *R. prowazeki,* and its action in sensitizing sheep red cells, and in reacting with antisera to form precipitates, is described by FRYGIN (p. 1039). MEL'NIKOV (p. 1255) has found the haemagglutination test sensitive, specific and suitable for the serological diagnosis of typhus, the peak titre being found between the 16th and 20th days of illness. The test was negative in persons who had recovered from typhus and in persons who had been vaccinated against it.

DOLEZAL (p. 23) produces evidence to indicate that the Coombs antiglobulin reaction for the detection of incomplete antibody to *R. prowazeki* is commonly positive in typhus and in the convalescent stage.

Hexylresorcinol (0·03% or 0·1%) will kill *R. prowazeki* but not lice; LIGANOVA (p. 576) suggests a soap-solvent-DDT-hexylresorcinol paste for killing lice, their ova, and rickettsiae.

WEISS *et al.* (p. 112) discuss the inhibition by acetyl-salicylic acid of strains of *R. prowazeki* (Madrid E) resistant to para-aminobenzoic acid; the effects of related compounds are also considered, and it is suggested that the results may be explicable in terms of competition between drugs at various transport and enzymatic sites.

WEISS and DRESSLER (p. 1155) describe how passage of the E strain of *R. prowazeki* in eggs, in the presence of increasing amounts of erythromycin, resulted in the selection of a resistant strain.

The use of cortisone in animals infected with Strain E of *R. prowazeki* has little effect on the course of the disease, and GENIG (p. 696) thinks that the ability of the strain to produce inapparent infection is stable.

ZDRODOVSKII and GOLINEVICH (p. 462) discuss the protective effects of Strain E of *R. prowazeki,* on the basis of animal experiments. IABLONSKAIA (p. 1040) shows that immunization with Strain E is not so effective as inoculation of the Breinl strain in producing protective antibodies or in the length of the immunity provoked. KOKORIN (p. 1041) shows that Strain E caused relatively slight changes in animals, compared with the Breinl strain, but that at about 1½ months after inoculation the immunity provoked by the E strain was equivalent to that provoked by the Breinl strain. Killed vaccine was inferior to both.

GOLDWASSER *et al.* (p. 358) studied the antibody response of persons vaccinated with live or killed epidemic typhus rickettsiae and subsequently challenged with virulent epidemic or murine rickettsiae. The specific antibody which developed after challenge was directed towards the infecting species in unvaccinated subjects, but some subjects vaccinated with epidemic strains and challenged with murine strains developed antibody to the epidemic type. The antibody response in vaccinated persons may therefore not be specific after infection with other rickettsiae.

PSHENICHNOV (p. 1038) found that after irradiation *R. prowazeki* and *R. quintana* were completely inactivated but behaved satisfactorily in the complement-fixation test and were effective in producing immunity in guineapigs.

A single dose of *R. prowazeki* vaccine in animals stimulates a phagocytic response, and a second dose produces an enhanced response, but LI BIN (p. 1040) shows that repeated injections are needed to produce satisfactory agglutinin and complement-fixation antibody levels, and to neutralize the toxin.

For 1 year after killed typhus vaccine (Durand-Giroud) has been administered, microagglutination titres below 1 in 640 for *R. prowazeki* or 1 in 320 for *R. mooseri* are not enough to establish the diagnosis of active typhus infection in those persons, though after 1 year such titres (or even less) could be accepted as indicating active infection (FOLIGUET, p. 1039).

GREIFF *et al.* (p. 1041) discuss the effect of irradiation on *R. mooseri* and *R. akari* growing in embryonated eggs; details are given in the original abstract.

SHMELEVA (p. 1255) found that treatment with cortisone delayed and shortened the febrile reaction of guineapigs infected with *R. mooseri*; at the higher doses rickettsiaemia was prolonged and complement-fixing antibodies occurred late but titres rose high, and animals which recovered showed strong immunity after 3 months.

From experimental evidence KANEKO (p. 463) concludes that murine lice can act as vectors of *R. mooseri* among rats.

LOVE and SMITH (p. 1042) attempted control of murine typhus in the southern United States by dusting rat habitats with DDT, and using anti-coagulants for poisoning. Human infections were greatly reduced, but reinfestation by rats soon took place when the measures were discontinued. Periodic short-term operations over areas as large as possible are advocated.

Proteus OXK Type. Vector: Mite

YU *et al.* (p. 360) demonstrated cross immunity in many Chinese strains of *R. tsutsugamushi,* and also observed that infection of mice with this organism appeared to give some protection against subsequent infection with Japanese B encephalitis virus. SHISHIDO *et al.* (p. 1256) showed that 13 strains collected from field rodents and one from man in Japan all conformed to the *R. orientalis* type, including one which had previously been named *R. tamiyai* on account of suspected differences.

KITAMURA (p. 1043) has isolated rickettsiae from *Apodemus speciosus*, and various trombiculid mites (which are named) from this and other rodents in part of Japan, and SAITO and OTSURU (p. 464) isolated strains of rickettsiae from various mites collected in Sado island, Japan.

Trombicula pallida is said probably to be a vector of the Tsurumi type of scrub typhus; FUKUYAMA (p. 463) reports on its distribution in part of Japan.

HSU *et al.* (p. 112) discuss the larvae of *Trombicula akamushi* var. *deliensis* in relation to tsutsugamushi in the Canton region, and suggest means of control.

LE GAC *et al.* (p. 360) point out that there is no elective spot for the eschar of scrub typhus; the mites bite on first contact with the body. Eschars are usually single but may be multiple; the authors describe their histological structure.

GUICHENEY (p. 23) notes that bitemporal headache is a common, and diagnostically valuable, symptom in scrub typhus.

Indeterminate Type. Vector: Tick

CRADDOCK (p. 464) gives an account of tick typhus in East Africa, where it seems to be confined to Europeans living in the Highlands; he makes special mention of the *formes frustes*.

It is not known why Rocky Mountain spotted fever is common on the west side of Bitterroot Valley (U.S.A.) and not on the east, though tick infestation of rodents is about the same on both. PHILIP (p. 24) thinks that *R. rickettsi* may be maintained in nature by mechanisms other than transovarian passage in ticks, and simultaneous feeding of infected and uninfected *Dermacentor andersoni* on susceptible hosts.

By toxin neutralization tests BELL and STOENNER (p. 800) showed that *R. rickettsi* could rapidly be distinguished from *R. conori,* but that the various strains of tick-borne typhus from Europe, Africa and India were closely related or identical. Rickettsiae of Siberian tick typhus could be distinguished from *R. rickettsi* and *R. conori* but showed one-way cross reactions with rickettsiae from *Amblyomma maculatum* and some Rocky Mountain spotted fever strains.

GOLINEVITCH (p. 800) found that in cross complement-fixation tests *R. conori* from the Black Sea area and *R. sibiricus* were closely related but not identical; strains associated with tick typhus in Kenya and India were indistinguishable

from the Russian *R. conori* but differed from *R. sibiricus*. LI BIN (p. 1256) describes the successful infection of lice with *R. sibiricus*.

The North Queensland strain of tick-bite fever rickettsiae (*R. australis*) is serologically distinct; WEYER (p. 1043) shows that it can infect guineapigs and mice, and also lice. Like all other rickettsiae pathogenic to man it can be maintained in the haemolymph of lice, largely extracellularly. The reactions of several of these rickettsiae in relation to lice are apparently matters of degree.

Animals infected with the rickettsiae of boutonneuse fever, and treated with cortisone, do not develop agglutinins so well as animals infected but not given cortisone; GIROUD *et al.* (p. 577) point out, therefore, that when a patient's serum is being studied it should be known whether cortisone—or an antibiotic—has been given.

Q Fever

EVANS and BAIRD (p. 25) report an outbreak of Q fever in Cardiff; milk-borne infection was unlikely, but there was association with a suburb bounded by farmland, and transmission by insects was suspected. HOLLAND *et al.* (p. 577) describe 2 outbreaks of Q fever in units of the Royal Air Force in Britain. The first seemed to have spread among the staff of a hospital from a patient who may have picked up the disease while visiting neighbouring farms. The second may have originated in men who had been in sheds previously used to harbour parturient sheep.

MELNOTTE and FOLIGUET (p. 1153) found positive microagglutination tests for various rickettsial diseases in a few human sera in Nancy, the highest proportion (4·8%) being for Q fever. Cattle and sheep were also positive for this and for the neorickettsial strain known as Q18. BLANC *et al.* (p. 581) were able to recover *R. burneti* from *Hyalomma aegyptium* fed on tortoises previously infected. In Belgium JADIN *et al.* (p. 801) found *R. burneti* agglutinins in a large proportion of sera of cattle, free from brucellosis, which had aborted.

KURZEJA (p. 235) reports the first known outbreak of Q fever in Poland, in which 63 human cases were found, and *R. burneti* was isolated from sheep's wool. The sheep, which originated the outbreak and had been imported from Rumania, were destroyed. BORISOV *et al.* (p. 1257) found serological evidence of this fever in dairy and wool workers, and in domestic animals, in Kazakhstan, and also in an eagle, a crow and a lark.

MODICA (p. 579) found positive complement-fixation tests for Q fever in 15% of sera tested in Tripolitania, and also in a high proportion of goats and sheep. HEISCH (p. 801) found *R. burneti* in *Lemniscomys striatus* in Kenya, and stresses the complex nature of Q fever infection in Africa. On serological evidence SUREAU (p. 235) diagnosed infection with *R. burneti* in man (11·6%) and domestic animals (23%) in Madagascar. Serological tests indicate that Q fever is endemic in Ibadan, Nigeria, with cattle, goats, sheep and fowls as probable reservoirs; COLLARD and UDEOZO (p. 25) comment that infection may be contracted by inhalation of dust; a large cattle market is situated within the township.

POPE *et al.* (p. 1156) show that in Queensland kangaroos and their ticks may harbour *R. burneti*, and the ticks may attach themselves to sheep. This reveals a new significance of ticks of wide host range.

FISH and LABZOFFSKY (p. 892) found evidence of *R. burneti* infection in 17·9% of 334 lactating cows from herds in Ontario, but almost complete lack of evidence of infection in man, in spite of extensive serological examinations of

local people, including abattoir workers. The explanation of this anomaly is not evident. LUOTO (p. 802) calls attention to the very widespread infection with *R. burneti* to be found in the United States, and to the evidence of recent spread, and the risk to man. Strains of *R. burneti* were isolated by STOENNER *et al.* (p. 114) from various rodents and ticks in Utah, and antibodies were found in the sera of other rodents. STOENNER and LACKMAN (p. 580) recovered (for the first time) strains of *R. burneti* from wild rodents in Utah. They were much more infective for hamsters than for guineapigs or mice, and hamsters seem to be the animals of choice for the isolation of these organisms.

BORGHANS-DELVAUX *et al.* (p. 465) produce serological evidence of Q fever in sheep and goats in Curaçao, and of a human case, and serological and other tests indicate that this infection occurs in man and domestic animals in Argentina (MAYER *et al.*, p. 696).

Experimentally, SOBĚSLAVSKÝ and SYRUCEK (p. 697) have shown that *R. burneti* can be recovered from fertile eggs laid by infected hens, but they do not think that fowls are normally important in spreading this disease.

ROSENBERG and KORDOVÁ (p. 579) give an account of intracellular forms of *R. burneti* as they appear in the electron microscope.

KORDOVÁ and REHÁCEK (p. 580) quote experiments which indicate that infective particles of *R. burneti* can pass through filters of 60 and 40 mμ mean porosity, and can infect ticks, and through them chick embryo yolk sacs, to produce typical *R. burneti*. KORDOVÁ (pp. 580, 1046) describes experiments which again suggest that *R. burneti* can exist as material capable of passing through filter membranes (58 and 40 mμ); yolk-sac preparations from eggs in which filtrates had been passaged gave negative complement-fixation reactions with immune sera, though infective for chick embryos but not showing typical *R. burneti*; the author suggests that antigenicity may be correlated with morphologically "mature" *R. burneti*.

IGNATOVICH (p. 1257) shows that temperature and *p*H are the most important factors influencing the storage life of *R. burneti* in fluid media. Low temperature (4°–6°C.) and high *p*H (8·0) appeared to be favourable. He (p. 1044) shows that *R. burneti* allowed to dry on various materials (wool, clay, sand) and kept at relative humidity of 53–68%, at 4°–6°C., could remain viable for 6–16 months. On sawdust, and on all materials at higher temperatures, the rickettsiae did not survive so long.

CARVALHO DE SOUZA *et al.* (p. 579) observed that *R. burneti* behaving as phase II, after exposure to complement-fixing antibody against that phase, apparently reverted to phase I.

SOMOVA *et al.* (p. 1047) describe their findings in guineapigs infected with *R. burneti* and *Brucella melitensis*, simultaneously or on different occasions. There was no evidence of antigenic relationship between the two, but the infections reacted on each other in persistence and dissemination.

MAGHAMI (p. 1045) has devised a simple rapid macroscopic test for Q fever in animals, which is described in the original abstract. TJALMA and BRAUN (p. 27) write favourably of the Luoto capillary agglutination milk test for identifying dairy cows infected with *R. burneti*. WELSH *et al.* (p. 26) found the microscopic slide agglutination test better than the complement-fixation, rickettsia-agglutination or capillary agglutination test, for the detection of antibody to *R. burneti* in sheep. They also found that *R. burneti* could repeatedly be recovered from surface pools (up to 1 month) and from soil (up to 150 days) during the

lambing season on ranches in California. In guineapigs infected with *R. burneti* Pospísil and Rychlo (p. 27) found complement-fixing antibodies constantly on the 12th day of infection, with maximum titres on the 21st day.

Roger and Roger (p. 465) show that *R. burneti* exhibits auto-agglutination at alkaline *p*H values and in hypertonic solutions at neutrality and acid *p*H levels. They now adjust stock suspensions to *p*H 7 and add a universal indicator to enable changes in *p*H to be detected.

Rychlo and Pospísil (p. 27) describe the pathology of Q fever after intranasal infection of guineapigs; pneumonia was the pulmonary feature but rickettsiae were found in lymph nodes and spleen also.

Robson and Shimmin (p. 235) describe a case of subacute endocarditis due to *R. burneti*, confirmed at autopsy by Andrews and Marmion (p. 235) who found colonies of rickettsia-like organisms in vegetations on the valves. This unusual case probably originated in an illness contracted in Panama. In Palestine Alkan and Bechar (p. 1258) report cases in which Q fever appeared to be the cause of hepatitis; this has only rarely been reported in the literature.

Berman *et al.* (p. 1046) use embryonated eggs for the safety testing of Q fever vaccine, as being more sensitive than guineapigs. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

See also p. 1177, Siniscalco *et al.*, **Favism and Thalassaemia in Sardinia and their Relationship to Malaria.**

Garnham, P. C. C., Bird, R. G., Baker, J. R. & Bray, R. S. **Electron Microscope Studies of Motile Stages of Malaria Parasites. II. The Fine Structure of the Sporozoite of** *Laverania* (=*Plasmodium*) *falcipara*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, Jan., v. 55, No. 1, 98–102, 24 figs. (23 on 7 pls.)

For the electron microscopic study of the sporozoites of *Laverania falcipara* [*Plasmodium falciparum*], infected salivary glands of *Anopheles gambiae* were fixed in 1% osmium tetroxide and passed through increasing strengths of ethanol (30–100%) after which they were immersed in 1% ethanol solution of tungstophosphoric acid, and then embedded and sectioned for electron microscopic examination.

It was found that the sporozoite is covered by a thick pellicle (35 mμ) consisting of 2 layers, which merges at the anterior end into a special structure consisting of concentric rings running around an apical cup. From this cup is given off a paired organelle with sinuous lobes which extend to the nucleus, near which there is a pit-like micropyle, through which the "sporoplasm" escapes into the liver, where it multiplies by schizogony. Extending from the apical cup

to the nuclear region, there are 14 peripheral fibrils. The cytoplasm of the sporozoites contains abundant mitochondria. The fine structure of the sporozoite of this human parasite shows a general resemblance to that of the avian *Haemamoeba gallinacea* [*Plasmodium gallinaceum*], described in a previous paper [this *Bulletin*, 1961, v. 58, 567].

The structural details can be best appreciated from the numerous micrographs illustrating this paper, while a diagram provides a key to their interpretation.

C. A. Hoare

BRAY, R. S. **Observations on the Cytology and Morphology of the Mammalian Malaria Parasites. I. A Process of Apparent Plasmotomy in the Preerythrocytic Phase of** *Laverania falciparum*. *Riv. di Parassit.* Rome. 1960, Dec., v. 21, No. 4, 267–76, 12 coloured figs. on 2 pls. [23 refs.]

The author draws attention to a type of multiplication in the pre-erythrocytic forms of some malaria parasites, in the course of which the multinucleate cytoplasm breaks up into a number of "islands" before the separation of merozoites [this *Bulletin*, 1951, v. 48, 701; 1952, v. 49, 236; 1958, v. 55, 614, 734]. This phenomenon has been described under various names, which the author regards as inappropriate. In order to interpret correctly the process involved, he examined liver sections of chimpanzees infected with *Laverania falcipara* [*Plasmodium falciparum*]. It was shown that in the late stages of pre-erythrocytic development the multinucleate schizont underwent cytoplasmic fission or plasmotomy into numerous islands, or cytomeres, containing many nuclei; these continued to divide into smaller islands, until small binucleate bodies were produced.

In discussing the nature of this process, the author points out that it differs from the classical form of schizogony, which he proposes to call "euschizogony", while the process described above, in which schizogony is combined with plasmotomy, is named "aposchizogony". Plasmotomy itself is redefined as a form of reproduction in which a multinucleate syncytium undergoes cytoplasmic fission, giving rise to further multinucleate bodies.

An analysis of the tissue forms of malaria parasites indicates that aposchizogony is also present in *P. inui* [*ibid.*, 1952, v. 49, 236], *P. knowlesi* [*ibid.*, 1958, v. 55, 734] and *P. gonderi* [*ibid.*, 1959, v. 56, 694]. The paper is illustrated by two plates of excellent coloured figures. *C. A. Hoare*

GOMA, L. K. H. **The Swamp Environment and the Breeding of Mosquitoes in Uganda.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1961, Apr., v. 36, Pts. 1/3, 27–36. [37 refs.]

The author proposes the following classification of swampland in Uganda:

A. Permanent Swamps
   (1) Littoral Swamps
   (2) Permanent Inland Swamps
   (3) Sphagnum Swamps

B. Transient Swamps
   (4) Seasonal Inland Swamps

The largest number of mosquito species (69 out of 78 species) have been found breeding in littoral swamps around lake shores. Within this type of habitat certain species, such as *Anopheles funestus,* prefer areas of clear, shallow water containing papyrus, reeds and short grass, whereas other species prefer very turbid water. The most productive part of this type of swamp is its inner edge, or lakeside, where the water contains water lettuce, *Pistia,* or *Ceratophyllum.* Permanent inland swamps, of streams, valleys and volcanic craters, are also productive of mosquito species (42 out of 78 species) and tend to produce greater numbers of mosquitoes. Seasonal swamps produce fewer species (27 out of 78 species) and *Sphagnum* swamps are very unproductive (2 out of 78 species). Many species of mosquito are found to breed in more than one type of swamp, but 31 species were found only in the littoral swamp environment and 4 species only in permanent inland swamps. Only 1 species of mosquito, *Anopheles coustani,* was found to breed in all of the four types of swamp recognized here. *B. R. Laurence*

SHUTE, P. G. & MARYON, M. **A Note on the Infectivity to Mosquitos of Patients in the Asymptomatic, Symptomatic and Post-Symptomatic Phases of Parasitic Relapses of Induced Infections with** *Plasmodium vivax* **(Madagascar Strain).** *Bull. World Health Organization.* Geneva. 1961, v. 24, Nos. 4/5, 654–7.

In a previous communication [this *Bulletin,* 1958, v. 55, 367] the authors described their findings regarding the infectivity of man to the mosquito in the early stages of *Plasmodium vivax* infections. The present paper is related to similar studies made during the asymptomatic phase of parasitic relapses. Case reports are presented of 7 patients in whom the attack ended in spontaneous recovery. Mosquitoes (laboratory-bred *Anopheles stephensi*) were fed daily on each patient, beginning on the first day of parasitaemia as detected by thick film examination and continuing until the onset of fever. Mosquitoes were also fed daily on the same patients throughout the clinical relapse until the fever disappeared spontaneously or was interrupted by treatment.

The chief point of interest brought out by this study is that in an untreated subject parasites may be quite numerous when the subject is able to lead a perfectly normal active life. In this series the asymptomatic period was longer than the symptomatic in nearly all the patients, and since during the former period they proved as infectious to mosquitoes as in the latter, and sometimes more so, the importance of such findings to the epidemiologist is obvious.

The problem is particularly serious in the case of underdeveloped countries, where in many areas the majority of those with malarial infections seldom receive specific drug treatment. *G. Covell*

CHARLES, L. J. **Field Trials with Chlorproguanil in the Prophylaxis of Malaria in Ghana.** *Bull. World Health Organization.* Geneva. 1961, v. 24, Nos. 4/5, 457–63. [10 refs.]

Chlorproguanil (ICI Compound 5943; Lapudrine) was synthesized in the course of developmental work on the biguanides. It has one more Cl atom in the

benzene ring than proguanil and has been shown to possess properties similar to those of the latter drug, but with a more persistent action [this *Bulletin*, 1958, v. 55, 128].

In a series of 4 field trials on schoolchildren in Ghana it was shown that chlorproguanil has a rapid action on *Plasmodium malariae* and on the asexual forms of *P. falciparum*. In weekly doses of 20 mgm. it protected a group of children from reinfection for 4 weeks, but thereafter irregular dosage was associated with a small number of *P. falciparum* infections. By the end of 6 months there was strong evidence of *P. falciparum* resistance to the drug, and also of cross resistance between chlorproguanil and pyrimethamine.

Unlike pyrimethamine, chlorproguanil was not secreted in the maternal milk in sufficient quantity to be of therapeutic value to young, wholly breast-fed infants.

The author concludes that while, in the absence of mass use of the biguanides or diaminopyrimidines, chlorproguanil might serve as an effective weekly prophylactic in responsible and conscientious households, it can hardly be considered suitable for long-term community use in rural tropical Africa.

G. Covell

GAUDETTE, L. E. & COATNEY, G. R. **A Possible Mechanism of Prolonged Antimalarial Activity.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 321–6, 3 figs. [18 refs.]

Chloroquine is but slowly broken down and excreted by man and for this reason acts as a good malarial suppressant. The nature of some metabolic products has been determined, that arising from N-dealkylation being the chief.

This investigation describes the inhibitory effect on metabolic transformation of β-diethylaminoethyldiphenylpropylacetate HCl (SKF 525-A) and a number of other substances on chloroquine metabolism, and their ability to maintain the level of this drug in plasma over a longer period than normal. Chloroquine was estimated by the method of BRODIE *et al.* [this *Bulletin*, 1947, v. 44, 793] after extraction by heptane, and almost complete recoveries were obtained. About 3–5 ml. of rabbit plasma were used for each determination after oral administration of the drug and suitable controls were employed. It soon became clear that when SKF 525-A was given with the drug plasma levels were maintained longer. When chloroquine was incubated with supernatants of rabbit liver homogenates in presence of nicotinamide, Mg^{++}, TPN and glucose-6-phosphate at *p*H 7·4 the drug was metabolized. Primaquine, pyrimethamine, amodiaquine and quinacrine [mepacrine] were as effective as SKF 525-A *in vitro* in inhibiting chloroquine metabolism while other substances tested showed more limited activity. The results obtained *in vivo* and *in vitro* with metabolic inhibitors did not always show good correlation. In spite of the fact that SKF 525-A can prolong chloroquine levels in the blood the authors believe it to be of no practical value since the effect of the reagent lasts only about 24 hours, as a result of fairly rapid excretion, and this also applies to other agents used. They found that chloroquine in combination with amodiaquine, hydroxychloroquine, or pamaquin gave rise to prolonged high plasma levels because they inhibited metabolism of the substance and furthermore would be useful since they possess antimalarial properties.

J. D. Fulton

YOUNG, M. D. & MOORE, D. V. **Chloroquine Resistance in** *Plasmodium falciparum*. *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 317–20, 1 fig.

In a previous communication, MOORE and LANIER (*Amer. J. Trop. Med. & Hyg.*, 1961, v. 10, 5) recorded observations on 2 patients engaged on seismographic explorations in Colombia, South America, who had contracted infections with *Plasmodium falciparum* which failed to respond in the usual manner to treatment with chloroquine. From one of these, who had his first attacks of malaria in the Magdalena Valley, Colombia, in May 1960, blood was sent to Columbia, South Carolina, where it was injected into a neurosyphilitic patient. This strain has so far been induced into 8 patients, 7 by infected blood and 1 by infected mosquitoes. 7 of these have been treated with chloroquine and the results are described and discussed in the paper under review.

Chloroquine diphosphate in single doses of 150 mgm. and of 600 mgm. base was given, as well as the standard 1·5 gm. regimen over a 3-day period (600 mgm. and 300 mgm. doses on the first day, then single 300 mgm. doses on the second and third days). Chloroquine dihydrochloride was used for injection. The drug was given under close supervision, the urines gave a positive Haskins test for chloroquine and the plasma levels of the chloroquine were at therapeutic concentrations.

6 of the 7 infections treated with chloroquine responded poorly to normal (0·6 gm., 1·5 gm.) and above normal (2·1 gm.) doses of the drug. The parasites were either not cleared from the blood stream or were eliminated slowly, after which relapses occurred at short intervals. In 2 instances, 1·5 gm. of chloroquine failed to eliminate the parasitaemia; in 2 others, the parasites increased in number after a 600 mgm. single dose.

This strain is thus resistant to the usual doses of chloroquine. The resistant quality was still present after mosquito passage. Details of all the patients treated are illustrated by graphs and tables in the text. *G. Covell*

THOMPSON, G. R. & CARTER, S. B. **A Controlled Trial of Daraclor.** *West African Med. J.* 1961, Apr., v. 10, No. 2, 93–7. [10 refs.]

The objects of this trial were to determine the value of Daraclor (a combination of pyrimethamine and chloroquine) in the prevention of overt malaria among the semi-immune African personnel of the Ghana army and to determine the minimum effective fortnightly doses for this purpose.

The subjects of the trial were 959 soldiers drawn from 6 units stationed in Accra, where *Plasmodium falciparum* is the causative parasite in the great majority of malaria infections. The trial was conducted during the early part of the rainy season, between the end of April and the end of June 1960.

The subjects were divided into 3 groups. Group A received 2 dummy tablets once a fortnight, Group B 2 Daraclor tablets and Group C one dummy and one Daraclor tablet. Each Daraclor tablet contains 15 mgm. of pyrimethamine and the equivalent of 150 mgm. of chloroquine base in the form of the sulphate.

For the purposes of the trial, any man reporting sick and found to have a combination of fever and malarial parasites in the peripheral blood was

regarded as a case of malaria. The percentage incidence was 6·3% in Group A, 0% in Group B and 0·3% in Group C, the incidence in Groups B and C combined being 0·15%. The only case of malaria not in the control group occurred in Group C on the day after the first tablet parade, *i.e.* it must have been in the incubation stage several days before the commencement of the trial.

It is concluded that both dosages of Daraclor were highly effective in suppressing malaria. Whether continuous usage of this regime would induce a significant degree of resistance among local strains of *P. falciparum* is debatable. It is proposed to hold a further trial at a later date in order to obtain additional evidence on this point. *G. Covell*

BURGESS, R. W. & BRAY, R. S. **The Effect of a Single Dose of Primaquine on the Gametocytes, Gametogony and Sporogony of** *Laverania falciparum*. *Bull. World Health Organization*. Geneva. 1961, v. 24, Nos. 4/5 451–6. [13 refs.]

The subjects of this study were 5 adults and 7 children aged 3 to 7 years (race not stated), in whose blood gametocytes of *Laverania falcipara* [*Plasmodium falciparum*] had been demonstrated. All infections were naturally acquired.

Mosquitoes (*Anopheles gambiae*, colony-bred) were fed on each subject on day 0, after which a single dose of primaquine, 15, 30 or 45 mgm. according to age, was administered. Subsequent mosquito feedings were made at intervals of 1 or 2 days up to the 7th day after treatment.

It was found that a single dose of primaquine cleared the blood of crescents in 4 to 8 days. In 5 out of 8 cases no gland infections were seen in *A. gambiae* fed on the first day after treatment; in 3 cases however sporozoites were found. After the first day following treatment no sporozoite infection of *A. gambiae* occurred in the 3 cases in which gland dissections were made. Feeding oöcyst-infected *A. gambiae* on a subject who had received primaquine 3 and 4 hours before the feed had no effect on the development of the parasite. After treatment gametogony was apparently normal but oökinetes did not penetrate the gut wall.

In none of the 12 subjects was any toxicity or untoward side effect noted.

It is concluded that a single dose of primaquine forms a very useful addition to the treatment of malaria infections in immigrant populations entering zones freed of malaria where anopheline vectors are still present. The mode of action of primaquine on gametogony and sporogony appears to be similar to that recorded for pyrimethamine by the authors and their colleagues [this *Bulletin*, 1960, v. 57, 337]. *G. Covell*

GUNDERS, A. E. **The Effect of a Single Dose of Pyrimethamine and Primaquine in a combination upon Gametocytes and Sporogony of** *Laverania falcipara* **(=***Plasmodium falciparum***) in Liberia.** *Bull. World Health Organization*. Geneva. 1961, v. 24, Nos. 4/5, 650–53.

The subjects of this study were 22 Africans attending the clinic of the Liberian Institute, Harbel, in whose blood gametocytes of *Plasmodium falciparum* had been found. Their ages ranged from 1 year up to adult life.

Pyrimethamine and primaquine were given in a single dose in the form of a combined tablet containing 25 mgm. and 20 mgm. (base) respectively, or a smaller tablet containing half that amount of each drug. 19 children (average age 3½ years) received the minimum dose (12·5 mgm. pyrimethamine plus 10 mgm. primaquine), one subject a medium dose (25 mgm. pyrimethamine plus 20 mgm. primaquine) and 2 adults the full dose (50 mgm. pyrimethamine plus 40 mgm. primaquine).

The combination of the 2 drugs in this dosage completely prevented sporogony and hence transmission in mosquitoes fed 1, 2 and 3 days after treatment of the gametocyte carrier, though gametocytes at these times were still to be found in the peripheral circulation. The average time of gametocyte clearance was 5 days.

It is concluded that the combination of pyrimethamine and primaquine should prove useful in mass drug administration in tropical Africa, where the aim is to sterilize gametocytes and prevent the infection of mosquitoes; but its use should be restricted to areas where no resistance to pyrimethamine has developed.

G. Covell

HODGKINSON, R., COURTNEY, K. O. & HAGGERTY, M. **Effect of Intermittent Administration of a Combination of Amodiaquin and Primaquine (Camoprim) on the Hematocrit of Primaquine-Sensitive and Non-Sensitive Children.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 128–34, 2 figs. [13 refs.]

A combination of amodiaquine and primaquine has been found highly effective in interrupting the transmission of malaria, and would be of value in malaria eradication schemes. As with other workers [this *Bulletin*, 1961, v. 58, 987] the authors wished to know whether a combination containing primaquine could be used safely in persons deficient in the red cell enzyme glucose-6-phosphate dehydrogenase (G6PD). They performed 3 experiments by using Infatab tablets containing 75 mgm. amodiaquine and 15 mgm. primaquine.

(1) 11 Negro children in an institution in the U.S.A. were selected as deficient in G6PD. On separate occasions they were given courses of the drug, administered weekly, in average doses of first 0·29 mgm., and then 0·45 mgm. per lb. of bodyweight, and the effect was measured by the fall in haematocrit reading expressed as a percentage of its original value. For the first course the greatest fall was 3·5% on the 17th day, and for the second course 4·2% on the 12th day. Immediately after the first course, when the most sensitive erythrocytes should have been destroyed, daily dosage of the drug for a week produced a further fall of the haematocrit, by 6·6% of its original value.

(2) Negro and Caucasian children, not sensitive to primaquine, showed no change in haematocrit on similar dosage.

(3) 235 East African and Congolese children were given Infatab, supplying a weekly dosage of 0·3 to 0·5 mgm. per lb. of bodyweight. Their status as regards primaquine sensitivity was not determined. In this case the effect was measured by changes in the haemoglobin level, which averaged 71% at the start; it actually rose during the 5 weeks' treatment, a result thought to be due to the control of malarial infections.

Thus, in the absence of malaria therapeutic doses of primaquine did not cause serious haemolysis, and in the presence of endemic malaria the drug was beneficial. *Alan B. Raper*

LIMBOS, P. & VANBREUSEGHEM, R. Pigmentation provoquée par l'amodiaquine. [**Pigmentation induced by Amodiaquine**] *Ann. Soc. Belge de Méd. Trop.* 1960, Dec. 31, v. 40, No. 6, 933–6.

The authors, from Antwerp, record 2 cases of bluish-grey pigmentation of the nails, palate and edge of the nose in European residents of the Congo, who had been taking 400 mgm. of amodiaquine base weekly for 3 years as a prophylactic against malaria. These resembled similar cases described by CAMPBELL in New Guinea [this *Bulletin*, 1960, v. 57, 1142].

[In the English summary of the paper the drug schedule is incorrectly described as " daily ".] *H. J. O'D. Burke-Gaffney*

SPENCER, T. & SPENCER, Margaret. **Malaria Assessment Methods.** *Papua & New Guinea Med. J.* Port Moresby. 1960, July, v. 4, No. 2, 55–61, 1 map.

The function of a malaria assessment team is to collect parasitological and entomological information before and after the implementation of measures of control or eradication. The team should ideally consist of a physician, a parasitologist and an entomologist, together with ancillary staff. The physician and parasitologist are concerned with the parasitological measurements, including assessment of the clinical effects and the general epidemiological picture. The entomologist's function is the study of the insect vectors and the factors involved in the transmission of the disease.

The fine measure of malarial prevalence is the inoculation rate, calculated from infant parasite rates. Parasite rates, gametocyte rates and parasite density estimations should also be done on a good sample of people in all the older age-groups. There should also be a minor demographic survey to determine the age composition of the population. This information will enable an estimate to be made of the infectivity of the population as a whole to the mosquitoes; the parasite involved; the state of immunity reached by adults; and whether their contact with malaria has been continuous or intermittent.

On the entomological side the vector or vectors should be proved by dissection; a sporozoite rate worked out; the biting habits of the vectors studied; the behaviour of the vector in human habitations; blood preferences of the vector, its longevity and susceptibility to residual insecticides.

Directions are given for working out the inoculation rate, longevity of the mosquito, index of stability, basic reproduction rate, critical density and ruling reproduction rate [see this *Bulletin*, 1958, v. 55, 229]. Details of various entomological techniques are also given. Stress is laid on the principle that an assessment team must be essentially small and mobile for the conditions prevalent in Papua and New Guinea. An anopheline species distribution list for the D'Entrecasteaux Islands, Papua, is appended to the paper. *G. Covell*

MATHIS, M. Considérations sur le problème de la lutte antipaludique en Corse. [**Observations on the Problem of Malaria Control in Corsica**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 1023–9, 2 figs.

The author discusses the problem of malaria in Corsica in view of the rapid development of the island as a tourist centre in recent years. The number of visitors expected during the summer of 1961 was 500,000.

Professor SAUTET, one of Brumpt's most distinguished pupils, revisited Corsica in 1953, and compared the endemicity of malaria in the island with that prevailing 20 years earlier. A control programme directed both against adults and larvae of anophelines had caused the reduction of the parasite rate from 23·4% to 0·5, 0·1 and virtually zero in 1950, 1951 and 1952, in which last year there was only one case of fresh malarial infection [this *Bulletin*, 1954, v. 51, 1224].

As the result of his own observations the author notes that anopheline mosquitoes including *Anopheles claviger* (3 specimens of which he collected as larvae near Porto Vecchio in 1960) are still present in the island and that there is always a chance of the importation of malarial infection from elsewhere. He instances an entry in the register of the dispensary at Porto Vecchio in May 1960 to the effect that the blood of a soldier lately returned from Algeria, had been found to contain both *Plasmodium vivax* and *P. falciparum*.

He concludes however that if patients with malaria entering Corsica are kept under observation and if control of anopheline mosquitoes is maintained, tourists should be informed that there is practically no risk of contracting malaria in Corsica, as is the case in the South of France, Italy, Spain and Greece.

[See also *ibid.*, 1960, v. 57, 1012.] *G. Covell*

BELIOS, G. D. **DDT Resistance in *A. sacharovi* and Control in Greece.** *Riv. di Malariologia.* 1960, June, v. 39, Nos. 1/3, 1–19, 1 map. [13 refs.]

The resistance of *Anopheles sacharovi* in Greece has been the subject of a number of investigations, some of the results being published [GEORGOPOULOS, this *Bulletin*, 1952, v. 49, 928; BELIOS, *ibid.*, 1956, v. 53, 20; LIVADAS and GEORGOPOULOS, *ibid.*, 1953, v. 50, 1007, and 1955, v. 52, 1053; DE ZULUETA, *ibid.*, 1960, v. 57, 103; PERRY, *ibid.*, 1961, v. 58, 16], others appearing in WHO documents. In this paper the author is attempting a synthesis; in the first place, only in regard to DDT.

A survey of field tests of actual resistance levels indicates that there has been comparatively little change since 1950. There is a suggestion of a slight decline in the last year (1959), which the author attributes to discontinuance of anti-larval treatments by aircraft. [But in that year the assessment method was changed from mainly Busvine/Nash tests to the WHO test, which might explain the difference.] It is, at least, clear that the extended use of DDT for many years in Greece has not produced uniformly high DDT resistance in *A. sacharovi*. The mosquito populations appear to be mixed, with a relatively small proportion of resistant individuals. Possibly the more susceptible mosquitoes are most easily irritated and thus escape death from DDT, as De Zulueta [*loc. cit.*] suggests; but the author notes that some mortality is caused in these susceptible mosquitoes, which do not all escape.

Results are given from a limited number of precipitin tests in 1958–59 which strongly suggest reduced feeding on man when compared with the extensive figures of BARBER and RICE for 1932–34 [*ibid.*, 1936, v. 33, 258]. The author finds it "difficult to understand why such a selection [by insecticide] should result in zoöphily in a species (or strain?) which has retained its endophily". [But surely the endophily has been artificially reduced by the irritant action of the DDT?]

It appears that the chief way in which the resistance of *A. sacharovi* interferes with control is to increase the frequency of necessary spraying cycles. The general result of insecticides on malaria in Greece has been an enormous reduction. It is significant that this has been achieved in spite of the refractory vector and also the increased breeding in expanding rice fields and increased sleeping in the open which followed the ending of the internal strife in 1949.

J. R. Busvine

PROTHERO, R. M. **Population Movements and Problems of Malaria Eradication in Africa.** *Bull. World Health Organization.* Geneva. 1961, v. 24, Nos. 4/5, 405–25, 7 figs. [26 refs.]

Movements of population form one of the most important factors hampering malaria eradication programmes, and in Africa this problem is perhaps more serious than in any other part of the world. The majority of these movements are free and uncontrolled, and are frequently inter-territorial in nature. All the malaria eradication pilot projects now in operation in Africa are being hampered by the problem of population instability, with constant reinfection taking place as a result. There is not one country in Africa in which the movements of population are contained within its own boundaries.

Some of these movements are traditional (pastoral nomadism); others have developed more recently (migrant labour). Whether they date from the past or not, they are phenomena which can neither be arrested nor easily controlled. They, and other aspects of the peoples' ways of life, must be accepted, and if they create problems in malaria eradication, ways and means must be found for adjusting programmes and techniques to fit in with them.

Types of population movements and their relationship to malaria problems are reviewed in some detail in respect of the Sudan, Ethiopia, Somalia, East Africa, Zanzibar, Rhodesia and Nyasaland, Nigeria and Ghana. More information on them and on the complex relationships between parasites, vectors and human beings is required, and inter-territorial cooperation is essential in obtaining this information and in planning.

G. Covell

METSELAAR, D. **Seven Years' Malaria Research and Residual House Spraying in Netherlands New Guinea.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 327–34, 3 figs. [22 refs.]

The Dutch section of New Guinea is sparsely populated by about 700,000 Papuans, of whom about half live in malarious areas in villages with 100 to 300 inhabitants. Malaria is classified as holoendemic in some inland plains, hyperendemic in some coastal areas, mesoendemic on coral islands off the shore and hypoendemic in mountainous areas. The chief mosquito vectors are *Anopheles*

punctulatus, A. farauti, and *A. koliensis*, all members of the *punctulatus* group of anophelines.

Residual spraying was started in 1954 in a pilot area, the basin of Sentani Lake [this *Bulletin*, 1956, v. 53, 154; 1957, v. 54, 651]. After one year, operations were gradually extended over other parts of the territory and early in 1960 some 180,000 persons were under protection by this method. Early in the campaign dieldrin was used in 2 areas, but the results were disappointing [*ibid.*, 1959, v. 56, 1221] and the chief measure employed had been the spraying of houses twice yearly with DDT at 2 gm. sq. metre.

In 1958 spraying was combined with the mass distribution of drugs (adult dosage 450 mgm. chloroquine base plus 50 mgm. pyrimethamine) [*ibid.*, 1959, v. 56, 1009]. This was done 3 times in 1958 and twice in 1959. In all areas evaluation surveys were made at a minimum interval of 3 months after the last drug distribution.

In several moderately endemic areas, eradication has been practically or almost achieved. Even in a holoendemic region, a point has been reached where eradication seems possible. In other areas, where people are described as of a roving disposition, the results of house spraying and drug distribution were disappointing. Changes in the ratio of the species of malaria parasites were not in accordance with expectations, *Plasmodium falciparum* showing an unexpected resurgence attributed to a more rapid loss of immunity to this species than to *P. vivax*.

Future policy will be to continue residual spraying and drug distribution, supplemented by the use of medicated salt in problem areas and gradual bonification. *G. Covell*

ERRATUM

In the abstract of the paper by Adam, Hamon and Bailly-Choumara published in this *Bulletin*, 1961, v. 58, 992, the passage in the second paragraph, p. 993, which begins "Since the gametocyte rates of both susceptible and resistant *A. gambiae* were essentially similar . . ." should read "Since the gametocyte rates of people in the treated and untreated villages were essentially similar . . .".

Ingram, R. L., Otken, L. B., Jr. & Jumper, J. R. **Staining of Malarial Parasites by the Fluorescent Antibody Technic.** *Proc. Soc. Exper. Biol. & Med.* 1961, Jan., v. 106, No. 1, 52–4, 1 fig.

Rhesus monkeys were hyperimmunized with trophozoites of *Plasmodium bastianellii* by allowing spontaneous recovery from the infection which followed the initial inoculation, and by giving 2 subsequent inoculations, the second of which did not produce further infection. Rabbits were also immunized with sporozoites of *Plasmodium gallinaceum*.

Trophozoites of *P. bastianellii* showed specific fluorescence after treatment with fluorescent antibody prepared from hyperimmunized monkeys, but this was of low intensity; a higher degree of intensity of specific fluorescence was obtained when blood forms of *P. gallinaceum* were treated with fluorescent serum prepared from the rabbits which had been immunized with sporozoites. Cross reactions between these two parasites could not be demonstrated by this technique. *W. E. Ormerod*

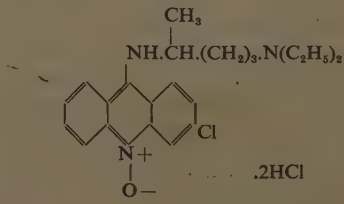
MEYER, H. & MUSACCHIO, M. de O. Estudo electron microscópico da forma exo-eritrocitária do *Plasmodium gallinaceum* em culturas de tecido. [**Electron Microscopic Study of the Exo-erythrocytic Form of** *Plasmodium gallinaceum* **in Tissue Cultures**] *Anais Acad. Brasileira de Ciencias.* 1960, Mar. 31, v. 32, No. 1, 91–4.

Heavily infected cultures of *Plasmodium gallinaceum* were cultivated in myocardial cells of chick embryos grown in roller tubes. They were fixed *in toto* for 30 minutes in 1% osmic acid, dehydrated in methyl alcohol and embedded in n-butyl methacrylate, after which sections were cut for examination by electron microscopy. The material in question contained all stages of exo-erythrocytic development of the parasite.

Young intracellular schizonts reveal an alveolar cytoplasm, containing striations like toxonema described for *Toxoplasma* [this *Bulletin,* 1955, v. 52, 828]. In older schizonts the nucleus is dispersed in the cytoplasm in the form of osmiophilic masses, which at a later stage begin to differentiate into distinct nuclei, each surrounded by a membrane. Later the nuclei migrate to the periphery of the schizont. In pre-segmenting schizonts the future merozoites are arranged in the form of a rosette around the central portion of the cytoplasm, which has a faint electronic density and contains canals. The developing merozoites show a greater density, due to fine granulation (250 Å) of their cytoplasm. They also contain a larger granule (800 Å) as well as an osmiophilic oval inclusion (0·4 × 0·25 μ) at the distal pole, while the central nucleus reveals minute granules (200 Å) and is surrounded by a fine (170 Å) membrane. The merozoites are connected by fine canals with the centre of the cytoplasmic body. The free merozoites show essentially the same structure as the attached ones. *C. A. Hoare*

THOMPSON, P. E., MEISENHELDER, J. E., NAJARIAN, H. H. & BAYLES, Anita. **Laboratory Studies on 3-Chloro-9(4-Diethylamino-l-Methylbutylamino) Acridine, 10-Oxide Dihydrochloride (CI-423) as an Antimalarial Compound.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 335–42. [13 refs.]

The most successful drug in treatment of malaria so far from the acridine series is quinacrine [mepacrine]. A number of acridine N-oxides have now been prepared and the drug named in the title, whose constitutional formula is shown, has proved more potent than quinacrine against *Plasmodium cynomolgi* and *P. lophurae* infections and furthermore it does not stain the skin.



Its activity was compared with that of amodiaquine and quinine as well. In avian malaria assays the methods reported [this *Bulletin*, 1953, v. 50, 603, 912] were used, in which chicks infected by trophozoites were treated by the drug-diet method. In monkey infections produced by intravenous injections of

trophozoites the course of parasitaemia was followed on stained smears after treatment by stomach tube and latency or cure was decided by the methods employed by SCHMIDT *et al.* [*ibid.*, 1949, v. 46, 709]. The comparative results obtained with different drugs are set out in tables. These results indicated that in *P. lophurae* infections CI-423 was 16 times as active as quinine, 4 times as active as quinacrine and about half as active as amodiaquine. This drug effected more cures of *P. cynomolgi* infections and suppressed parasitaemia more rapidly than amodiaquine or quinacrine. Over a period of 2–4 weeks staining of the skin did not occur, as happens with quinacrine. The results indicate that CI-423 is likely to be an efficient suppressant in human malaria.

J. D. Fulton

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:— epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

NIGERIA, NORTHERN. MINISTRY OF HEALTH. **Sleeping Sickness Service: Annual Report for 1960.** 15 mimeographed pp. + 11 pp. of tables. 1961: Kaduna.

This report records an incidence even lower than in the previous year [see this *Bulletin*, 1961, v. 58, 29] which was the lowest recorded until then. There were no serious outbreaks during the year. Persons examined numbered 1,629,511 and 3,789 cases of sleeping sickness were notified from all sources, of which nearly 20% were relapses. Failure to cooperate in attending surveys and completing treatment increased the danger to public health, and pentamidine has been given as a routine immediately after diagnosis, and also prophylactically to workers in mines and people in resettlement areas. Two small outbreaks were detected in Lere District of Zaria (51 cases) and in Jos Division (18 cases).

The Kano-Katsina clearing scheme, commenced in 1950, was successfully completed. 3,204 miles of river have been cleared, 8 barrier clearings made and the intervening riverine vegetation allowed to regenerate. Control by residual insecticides has given good results in some areas and has been only temporarily successful in others, requiring re-treatment or a different control method. One river, a large focus of sleeping sickness, was treated successfully for a distance of 30 miles and over a width of 1 to 5 miles in 102 days with 30 to 36 pressure sprayers at a total cost of £8,500. Re-appearance of fly, however, in an area close to Bauchi controlled by DDT, had to be recontrolled by partial clearing of vegetation over 45 miles at a cost of £38 per mile. Why fly should reappear in areas treated with insecticide remains obscure. Reinvasion has not been proved and routine survey methods have revealed no residual population; new methods of assessment of fly at low densities are needed. It is worthy of note that fly have been found breeding in a compound under a thatched market stall and under the eaves of houses. Rice farming as a fly

control measure was not successful on the river Mu because only 2 of the 280 miles had been effectively cleared. It is considered that rice farming should be used for consolidation of existing clearings and not for primary clearing.

The report ends with a series of tables summarizing the incidence and distribution of cases of sleeping sickness. *T. H. Davey*

JADIN, J. & PIERREUX, G. Un milieu de culture pour trypanosomides. [**A Culture Medium for Trypanosomes**] *Ann. Soc. Belge de Méd. Trop.* 1960, Dec. 31, v. 40, No. 6, 903–6.

DESOWITZ, R. S. **Antigenic Relationships between Polymorphic and Monomorphic Strains of the *brucei* Group Trypanosomes.** *J. Immunology.* 1961, Jan., v. 86, No. 1, 69–72, 1 fig. [12 refs.]

A study of the cross reactions of species of the *brucei* group of trypanosomes —*Trypanosoma brucei, T. gambiense*, and *T. rhodesiense*—was made by the respiratory test of Desowitz (*Nature*, 1956, v. 177, 132) with a Warburg respirometer.

One monomorphic and one polymorphic strain of each species (with an additional polymorphic strain of *T. rhodesiense*) were used; the parasites were extracted from the blood of rats, and the serum of infected sheep was used as antibody. A considerable degree of cross immunity was found between monomorphic strains of the different species; on the other hand reactions of polymorphic strains were more specific. The author concludes that strains of *brucei* group trypanosomes tend to lose their antigenic specificity on passage by syringe at the same time as they lose their polymorphism. *W. E. Ormerod*

WIJERS, D. J. B. & WILLETT, K. C. **Factors that may influence the Infection Rate of *Glossina palpalis* with *Trypanosoma gambiense*. II. The Number and the Morphology of the Trypanosomes present in the Blood of the Host at the Time of the Infected Feed.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 341–50, 1 fig. [12 refs.]

Glossina palpalis, not more than a day old, were allowed to feed on *Erythrocebus patas* monkeys infected with one of four strains of *Trypanosoma gambiense* of Northern Nigerian origin, to which this fly is very susceptible. The infection rate in the flies was ascertained by the " probing " technique, and by dissection of the gut, 3 weeks or more after feeding, while the density and type of trypanosome (long, intermediate or stumpy) [this *Bulletin*, 1959, v. 56, 1113] were observed in the original (monkey) host. Statistical analysis indicated that the infection rate of the fly was uninfluenced by the parasitaemia, but was higher in proportion to the absolute number of stumpy forms.

Another series of experiments was then carried out on *T. brucei*, and it was noticed that it was practically only stumpy trypanosomes which developed further in the gut. The posterior end became streamlined, the flagellum started to become free and finally the ribbon form developed.

These observations confirm the original opinion of Muriel ROBERTSON [this

Bulletin, 1913, v. 1, 44], among much other conflicting data from different parts of Africa.

[For part I, see *ibid.*, 1959, v. 56, 597.] *P. C. C. Garnham*

Southon, H. A. W. & Robertson, D. H. H. **Isolation of** *Trypanosoma rhodesiense* **from Wild** *Glossina palpalis*. [Correspondence.] *Nature*. 1961, Feb. 4, v. 189, 411–12.

This paper gives an account of the first recorded isolation of *Trypanosoma rhodesiense* from wild *Glossina palpalis*.

14,500 *G. palpalis fuscipes* were collected at Lugala, south-east Uganda, and allowed to feed on batches of guineapigs and rats. 21 strains of *brucei*-group trypanosomes were isolated. Trypanosomes from these strains were pooled in 4 batches, and injected into a man, each batch at a different site. On the 9th day of the infection, the peripheral blood contained 420,000 trypanosomes per cmm. 3 of the 4 sites of injection showed trypanosomal chancres. The 21 strains, therefore, contained certainly 1, probably 3, and possibly more strains of *T. rhodesiense* infective for man. *W. E. Ormerod*

Bursell, E. **Post-Teneral Development of the Thoracic Musculature in Tsetse Flies.** *Proc. Roy. Entom. Soc. of London*. Ser. A. 1961, June 16, v. 36, Pts. 4/6, 69–74, 3 figs. [13 refs.]

Fraga de Azevedo, J., Pinhão, R. da C., Abreu, M. M. de A. & Dias, J. A. T. S. Criação de *Glossina morsitans* West. no laboratório. [**Breeding of** *Glossina morsitans* **in the Laboratory**] *Anais Inst. Med. Trop.* Lisbon. 1960, Jan.–June, v. 17, Nos. 1/2, 5–35, 5 figs. & 1 graph. [13 refs.] English summary (7 lines).

See this *Bulletin*, 1958, v. 55, 487.

Saunders, D. S. **Laboratory Studies on the Biology of** *Syntomosphyrum albiclavus* **Kerrich (Hym. Eulophidae), a Parasite of Tsetse Flies.** *Bull. Entom. Res.* 1961, June, v. 52, Pt. 2, 413–29, 6 figs. [27 refs.]

Robertson, D. H. H. **Nitrofurazone-Induced Haemolytic Anaemia in a Refractory Case of** *Trypanosoma rhodesiense* **Sleeping Sickness: the Haemolytic Trait and Self-Limiting Haemolytic Anaemia.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 49–63, 1 graph. [36 refs.]

Nitrofurazone has proved of value in the treatment of some patients with trypanosomiasis refractory to treatment with the other recognized trypanocidal drugs. Unfortunately the drug itself may cause a serious polyneuropathy, also it may cause disorder of the pyruvate metabolism.

A male African in Uganda was seen in January 1958 with symptoms and signs of trypanosomiasis; parasites (*Trypanosoma rhodesiense*) at that time

were numerous in gland juice and some were present in the cerebrospinal fluid [CSF], which also had a high cell and raised protein content. After an initial dose of Suramin a course of treatment (38·5 ml.) with Mel B was given with considerable betterment of the patient's condition. Seen again in September 1958 he had relapsed; another course (35·0 ml.) of Mel B was given, again with much improvement. In March 1959, on further relapse, nitrofurazone was given at a dosage of 0·5 gm. by mouth thrice daily for 3 days. This caused vomiting on the first day and somnolence and weakness on the next 2 days; 2 days after its completion there was jaundice and the urine first became dark and then a port-wine colour; casts were found in it and haemoglobin was identified spectroscopically. The red cell count fell to 1·75 million per cmm. and the blood haemoglobin to 5·7 gm. per 100 ml. 12 days after the treatment both the latter began steadily to rise; during this period Imferon had been given and also a further course of Mel B, again with relief of the trypanosomiasis.

In September 1959 a further and more marked relapse was evident; a course of Mel W (2,525 mgm.) was then given but the response was much inferior to that following the earlier treatments. In the expectation that the haemolysis would be self-limiting, as is that caused by acetanilide, primaquine and sulphanilamide, further treatment with nitrofurazone orally and Mel B intravenously was started in October. Prednisolone was given by mouth and vitamin supplements intramuscularly in the hope of avoiding side effects of the nitrofurazone; these hopes were not substantially fulfilled. There was a 7-day period of apparent latency in the anticipated haemolysis which was succeeded by a decisive haemolysis with a rapid fall in the red cell count and blood haemoglobin. In consequence the nitrofurazone treatment was stopped, but the haemolysis continued and the haematocrit reading fell to 28% within the next 2 days. A phase of recovery then began, so on the 15th day nitrofurazone was again given and continued for 4 days. There was further marked haemolysis so the drug was stopped when the haematocrit reading approached 25%. Another and more rapid phase of recovery followed this and yet another nitrofurazone course was started on day 25 and continued for 8 days; during this period there was a sustained recovery ("true recovery") in spite of evidence of concurrent haemolysis towards the end of the 8-day period. A further attempt to give nitrofurazone after another 3-day interval had to be abandoned in view of increasing evidence of polyneuropathy.

The last report on the patient in January 1960 was that he still had active trypanosomiasis, with parasites in the CSF and physical signs and symptoms of central nervous system involvement.

Throughout the treatment outlined above detailed haematological observations were made; these data are set out graphically in coincident charts which should be consulted in the original. *In vitro* Heinz-body formation tests, and screening tests for glucose-6-phosphate dehydrogenase following the Motulsky method were undertaken on this patient. They were also done on 32 Africans suffering from trypanosomiasis and on one control in order to determine the incidence of erythrocyte abnormality associated with the haemolytic tendency and thereby to forecast the probable incidence of haemolytic anaemia in the event of nitrofurazone treatment. The high incidence (5 of the 33) of the haemolytic trait in these Africans indicates the possible dangers attending treatment of Africans with such drugs as nitrofurantoin or nitrofurazone. The reported frequency of the haemolytic trait among groups of other peoples varies

greatly; for example, it is low in Chinese and under 1% in Caucasians, it is low in Ashkenazic Jews but high (22%) in Sephardic Jews in Iraq; but in general it is high in Africans wherever they are found (American Negroes 10%).

The technique of interrupted but continued administration of nitrofurazone, governed by haematocrit readings, adopted in the treatment of the case of trypanosomiasis here described, was warranted on the assumption that the drug-induced haemolytic anaemia was self-limiting and that recovery from it was spontaneous despite continued drug treatment. The employment of nitrofurazone in trypanosomiasis, with this in mind, is justified in an effort to sterilize refractory infections. Unhappily in this particular case parasitic cure was not achieved. *A. R. D. Adams*

GODFREY, D. G. **Types of *Trypanosoma congolense*. I. Morphological Differences.** *Ann. Trop. Med. & Parasit.* 1960, Dec., v. 54, No. 4, 428–38, 12 figs. on pl.

In a recent biometrical study of trypansomes of the *congolense* group, HOARE [this *Bulletin*, 1959, v. 56, 926] restored *Trypanosoma dimorphon* to its original position as an independent species. It differs from *T. congolense* in greater length, the two species falling into distinct groups whose mean lengths do not overlap. However, it was stipulated that should strains with intermediate mensural characters be discovered, it might be necessary to reduce the rank of *congolense*-like strains to a minor taxon.

In the present paper the author provides evidence of the presence of such a "missing link". In a thorough study of the morphology of 5 strains of *congolense*-like trypanosomes isolated in Nigeria, he demonstrated the existence of strains of the following 3 types, characterized by their mean lengths (*M*) and percentage of short (*s*) and long (*l*) forms present: (1) *congolense* type: M = 11·20–13·80μ, s = 29–57%, l = 0–2%; (2) intermediate type: M = 12·98–13·85μ, s = 17–42%, l = 4–11%; (3) *dimorphon* type: M = 13·75–15·68μ, s = 4–16%, l = 20–36%.

The author does not commit himself to the taxonomy of these types, believing "that the terms used . . . will suffice until . . . other differences between types are demonstrated by serological and physiological techniques". In the meantime he regards *T. congolense* as a "complex of types" with the mensural characters given above. *C. A. Hoare*

WALKER, P. J. & ASHWOOD-SMITH, M. J. **Dimethyl Sulphoxide, an Alternative to Glycerol, for the Low-Temperature Preservation of Trypanosomes.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 93–6, 2 figs.

The use of dimethyl sulphoxide was investigated as an alternative to glycerol in the preservation of trypanosomes at −79°C. 5% dimethyl sulphoxide was shown to be approximately as effective as 10% glycerol in the preservation of 2 strains of *Trypanosoma congolense*.

[The high heat of solution of dimethyl sulphoxide makes it essential to cool solutions to which it has been added. This is a disadvantage as its use is likely to involve slightly more complicated technique than that used with glycerol, since with the latter no cooling is necessary.] *W. E. Ormerod*

World Health Organization. Technical Report Ser. No. 202. **Chagas' Disease. Report of a Study Group. Washington, D.C., 7–11 March 1960.** 21 pp. 1960. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [1s. 9d.; $0.30; Sw.fr. 1.–.]

A study group of experts from the Americas met in Washington in March 1960 to consider the public health significance of Chagas's disease, and this document gives an account of their proceedings which forms an up-to-date résumé of this important disease and of the less important (and probably non-pathogenic) infection due to *Trypanosoma rangeli*. Little information was presented on *T. cruzi* itself, its vectors or its reservoirs, but good descriptions are given of the symptomatology of the disease, the pathology and immunity, diagnostic procedures, treatment (there is no effective therapy) and control (apart from improvement to housing, BHC has proved to be an ideal triatomacide).

Recommendations were made on the following points: systematic investigation of cases of "mega" and congenital infections; identification of the antigenic composition of the parasite and its relation to immunity; the metabolism of the parasite and a possible link with an effective chemotherapeutic agent; the physiology of the vector. *P. C. C. Garnham*

Vichi, F. L. Estudo do parasitismo na medula espinal de ratos na fase aguda da moléstia de Chagas. [**Study of Parasitism in the Spinal Cord of Rats at Acute Stage of Chagas's Disease**] *Rev. Inst. Med. Trop.* São Paulo. 1961, Jan.–Feb., v. 3, No. 1, 37–42, 4 figs.

The English summary appended to the paper is as follows:—

"The author presents a quantitative analysis of leishmanial pseudocysts found at the cervical, dorsal and lumbar levels of the spinal cord of rats dying at the acute stage of Chagas' disease.

"The number of pseudocysts was counted in the white and the gray substance, at three levels of the spinal cord. The lumbar level of the spinal cord was the most intensely parasitized. These data could be closely related to the greater incidence of posterior limb paralysis described in the animals at the acute stage of Chagas' disease.

"The parasitism, which was found to be intense in animals, had the peculiar characteristic of being greater in the gray than in the white substance."

Brener, Z. Atividade terapêutica do 5-nitro-furaldeído-semicarbazona (nitrofurazona) em esquemas de duração prolongada na infecção experimental do camundongo pelo *Trypanosoma cruzi*. [**Therapeutic Activity of 5-Nitro-2-Furaldehyde-Semicarbazone (Nitrofurazone) in Protracted Schemes upon Mice experimentally infected by** *Trypanosoma cruzi*] *Rev. Inst. Med. Trop.* São Paulo. 1961, Jan.–Feb., v. 3, No. 1, 43–9, 1 fig. [11 refs.] English summary.

Adult white mice were inoculated intraperitoneally with about 70,000 *Trypanosoma cruzi*, strain Y, and then treated with nitrofurazone [this *Bulletin*, 1957, v. 54, 663] orally in various schemes of treatment as follows:— (a) 65

animals were given 100 mgm./kgm. bodyweight for 53 consecutive days, starting on the 4th day after infection ; (b) 15 animals were given the same treatment but starting on the day after infection ; here 10 controls were used ; (c) 15 animals were given the above dosage starting on 4th day but for 20 days only.

Blood films, blood cultures, xenodiagnosis and subinoculations into other animals were used as tests for cure ; the mice were finally killed and the tissues examined histologically. In 45 animals in group (a), though the blood films were naturally positive on the 4th day, none was found positive even up to 10 weeks afterwards ; but subinoculation was positive in 2. Of the remaining 20 animals in this group, xenodiagnosis was positive in 1 case and all others were negative by every test used. 1 blood culture and 2 subinoculations were positive in the first 45 animals. In group (b) blood films were repeatedly negative though the 10 controls were positive and these mice died ; 5 animals were re-inoculated 50 days after the end of treatment and the definite acute phase of trypanosomiasis was seen. In 10 animals in group (c) subinoculation into other mice gave 8 positive results.

The author considers that a direct action of the drug on the intracellular forms is improbable since the results in group (c) were so poor. He suggests the trial of other drugs for prolonged periods but states that in view of the fact that nitrofurazone has already been used in African trypanosomiasis [*ibid.*, 1958, v. 55, 135, 136] he feels that its use in Chagas's disease is justified.

[On the basis of the doses used in mice this would mean that for a child weighing 30 kgm. a dose of 3 gm. daily would be needed. The vehicle and route of administration would require careful consideration.]

W. K. Dunscombe

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Lewis, D. J. & McMillan, B. **The Phlebotominae of Nigeria (Diptera: Psychodidae).** *Proc. Roy. Entom. Soc. of London.* Ser. B. 1961, May 9, v. 30, Pts. 3/4, 29–37, 2 figs. [40 refs.]

This is mainly a list of the species of sandflies found in Nigeria, and includes a description of one new species, *Sergentomyia murphyi*, from West Africa. The authors comment generally that the common sandflies of Nigeria are not known to bite man throughout their range, although several species have been observed to do so locally in Africa. They relate the absence or scarcity of kala azar in Nigeria with the apparent unimportance of sandflies as a pest of man [this *Bulletin*, 1956, v. 53, 40 ; 1958, v. 55, 382]. *B. R. Laurence*

GHOSH, B. K., HALDAR, D., RAY, J. C. & CHATTERJEE, A. N. **Leishmanicidal Property of Nystatin and its Clinical Application.** [Correspondence.] *Ann. Biochem. et Exper. Med.* Calcutta. 1961, Jan., v. 21, No. 1, 25–8, 1 fig. [11 refs.]

The inhibitory activity of nystatin on the metabolism of *Leishmania donovani* has already been reported [this *Bulletin*, 1960, v. 57, 1034]. Similar results were obtained with two other antibiotics, amphotericin B and AYF-B. All three markedly inhibited growth. The effect of nystatin on a patient with post-kala-azar dermal leishmaniasis has now been tested. The proprietary drug Mysteclin V used, contained tetracycline as well as nystatin, 250 mgm. of the former (which does not affect growth of *L. donovani*) and 100 mgm. of the latter per capsule. Besides the capsules nystatin in propylene glycol was administered locally. After a few days *L. donovani* could not be isolated from the skin nodules and the clinical condition of the patient had improved. *J. D. Fulton*

PIFANO C., F. Algunos aspectos de la patologia comparada geografica de la leishmaniasis tegumentaria en el tropico americano. [**Observations on the Comparative Geographical Pathology of Cutaneous Leishmaniasis in Tropical America**] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 510–17, 2 figs. on 2 pls. [19 refs.]

This paper gives a useful résumé of cutaneous leishmaniasis in South America, where besides the classical form—espundia—are found uta, chiclero's ulcer, and another totally distinct type called "leproid" or "diffuse" leishmaniasis, observed first in Bolivia and more recently in Venezuela [CONVIT *et al.*, *Mem. del VI Congreso Venezolano de Ciencias Médicas*, 1955, IV, p. 2189, Caracas, Venezuela; MAYER *et al.*, this *Bulletin*, 1950, v. 47, 611]. The last type shows many organisms in the lesions which easily infect mice or hamsters. These animals develop swellings in the skin, rich in parasites and eventually ulcerating. Histologically, acanthosis is a feature with numerous lymphocytes, vacuolated histiocytes, plasma cells and giant cells. The human cases in Venezuela always give a negative Montenegro reaction. The author thinks that absolutely distinct species or varieties of *Leishmania* are responsible for the different forms of the disease.

Two good illustrations accompany the paper. *P. C. C. Garnham*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

ROSHDY, M. A. **Observations by Electron Microscopy and other Methods on the Intracellular Rickettsia-Like Microorganisms in *Argas persicus* Oken (Ixodoidea, Argasidae).** *J. Insect Pathol.* New York. 1961. June, v. 3, No. 2, 148–66, 13 figs. [26 refs.]

ZARNEA, G., ALEXANDRESCO, N., IONESCO, Honorina, VOICOULESCO, R., SZÉGLI, Lucia, PEREDERI, S. & MUNTEANU, P. Recherches épidémiologiques sur un foyer de fièvre " Q " dans une ferme à caractère agro-zootechnique. **[Epidemiological Investigations on a Q Fever Focus in an Agrotechnical and Zootechnical Farm]** *Arch. Roumaines Path. Expér. et Microbiol.* 1961, Mar., v. 20, No. 1, 1–12, 3 graphs. [10 refs.]

This interesting paper presents some of the findings which emerged from studies undertaken during 1956–58, after an influenza-like illness affecting 22 workers on a large farm had been diagnosed as Q fever on the basis of serological tests and the isolation of *Rickettsia burneti* from a patient. Nearly 40% of sera from persons living on the farm gave positive complement-fixation tests with antigens of *R. burneti*; repeated tests over the next two years showed about the same percentage of positives, although the proportion of sera with low titres (1 in 8 to 1 in 16) rose from 28% to 78% during this period. Of persons with positive sera, about one-half had experienced clinical symptoms suggestive of Q fever. The majority of infections occurred during the early part of the year, with a peak incidence in May (the total number of cases is not given, but a graph indicates that 59 patients with clinical symptoms were seen in 1957, after which only sporadic cases—4 in the first half of 1958—were encountered). The majority of typical infections were among workers in the " zootechnical " department of the farm.

Positive serological tests were obtained with sera from 56 out of 350 cattle at the beginning of the study period; the proportion of animals with positive sera decreased progressively (to 3·58% in June 1958). No positive tests were obtained with sera from dogs, goats and fowls. In studies of material from a wide range of animal, bird and arthropod species collected in and around the farm, a strain of *R. burneti* was isolated from a hedgehog (*Erinaceus europaeus*) found near a farm building where cases of Q fever had occurred, and positive complement-fixation tests were obtained with sera from 1 out of 3 magpies (*Pica caudata*) and 9 out of 49 buzzards (*Buteo buteo*). *R. S. F. Hennessey*

BREZINA, R. & URVÖLGYI, J. **Phase Variation Phenomenon of** *Coxiella burneti* **in the Agglutination Reaction.** *Acta Virologica.* Prague. 1961, May, v. 5, No. 3, 160–66. [15 refs.]

A comparative study of antigens prepared from various strains of *Rickettsia burneti* (Henzerling, Florián, *Ixodes ricinus*, and L 35) showed that the phase of the antigens as determined by the complement-fixation reaction was also revealed by their behaviour in agglutination tests with guineapig and human sera. From the results of antibody absorption experiments it was concluded that the same antigens and antibodies reacted in agglutination and complement-fixation tests and that the chief factor responsible for phase variation was a change in the relative dominance of two different antigens.

The Nine Mile strain was not agglutinated by any of the human and guineapig sera used in this work, indicating that the variable agglutinability of strains of *R. burneti* could not be explained entirely by the phase variation phenomenon. [See also this *Bulletin*, 1957, v. 54, 1171 and 1959, v. 56, 292.]

R. S. F. Hennessey

BARTONELLOSIS

REYNAFARJE, C. & RAMOS, J. **The Hemolytic Anemia of Human Bartonellosis.** *Blood.* 1961, May, v. 17, No. 5, 562–78, 10 figs. [32 refs.]

By the use of isotope labelling methods the following conclusions were reached about the anaemia of bartonellosis. The patient's own erythrocytes (100% parasitized) disappeared rapidly, to the extent of 50% in 6 days, but the cells that survived this period disappeared at a normal rate. Almost the same result was obtained with normal erythrocytes that were injected into a patient in the febrile anaemic stage, and also with erythrocytes from a patient who had just recovered from the febrile phase. But erythrocytes from a patient in the eruptive phase (verruga peruana) survived normally in a febrile subject. Evidently they acquired this property of resistance some time after the cessation of fever. There was evidence of increased sequestration of erythrocytes in the spleen and liver. Although the marrow showed intense activity, and the red cell iron turnover was increased in every case, this increase was least in patients in whom the disease was most active, and in such patients too the reticulocyte output was poorest. Regeneration became active as the fever subsided.

Other studies showed that the parasitized cells had increased mechanical fragility, that protoporphyrin unsaturated with iron accumulated in the erythrocytes, that a macrocytosis existed even among the non-reticulated red cells, and that no evidence could be found of any immune haemolytic mechanism.

[For earlier studies, see this *Bulletin*, 1960, v. 57, 236 *ter*.] *Alan B. Raper*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

SPENCE, L., DOWNS, W. G., BOYD, C. & AITKEN, T. H. G. **Description of Human Yellow Fever Cases seen in Trinidad in 1959.** *West Indian Med. J.* 1960, Dec., v. 9, No. 4, 273–7.

In January 1959 there occurred in Trinidad, where the disease had not been observed since 1954, 2 cases of jungle yellow fever in Nariva-Mayaro County among woodmen employed in forest areas near the Nariva Swamp. Neither man had been vaccinated against yellow fever and, on medical examination, neither showed a clear-cut clinical picture enabling differentiation to be made between yellow fever and the short-term pyrexias commonly experienced in the county. Both patients were bled during the acute phase of illness: one (Case I) 2 days, the other (Case II) 5 days after onset of symptoms, when their temperatures were 102°F. and 100·6°F., respectively.

By the intracerebral inoculation of 2-day-old mice with serum from these specimens virus was isolated in each case. When, with serum from Case I, the mice became ill on the 7th post-inoculation day, a crude saline antigen was prepared from their brains and subjected to complement-fixation tests with

hyperimmune mouse sera prepared against a number of Group B arthropod-borne viruses: yellow fever, dengue, Ilhéus and St. Louis. The yellow fever hyperimmune serum was found to give a titre of 1 in 64 or higher, while the other sera were negative at a 1 in 4 dilution. Thus on the 8th day after receipt of this patient's blood the virus was isolated and identified as yellow fever. The virus from Case II was also identified by complement fixation as described above. The identification of each virus was confirmed by the neutralization test.

On convalescent serum specimens obtained from both men, 23 days and 40 days, respectively, after onset of illness, series of tests were carried out against antigens prepared from the above-mentiond Group B viruses and from the Group A Mayaro virus (to serve as control). In both cases there occurred with all 4 Group B viruses a striking conversion in haemagglutination-inhibition and complement-fixation test reactions. In the second case, in which the quantity of each of the Group B viruses neutralized by the patient's serum specimens was determined, it was found that, although the conversion with homologous virus was most pronounced (more than 2·8 log difference between the quantity of virus neutralized in the acute and convalescent sera), nevertheless the conversions with Ilhéus and St. Louis both exceeded 1·0 log, being, respectively, 1·6 and 1·3 logs. From these results it is clear that in the 2 cases mentioned a serological diagnosis could hardly have been made and that virus isolation was essential for diagnosis.

From a study, made in 1959, of monkey morbidity and mortality in east Trinidad it emerged that yellow fever virus must have been active in the Nariva Swamp area during the previous 6 years. The number of monkeys in eastern Trinidad is, however, estimated as being too small to ensure a continuous year-in-year-out cycle involving monkey-*Haemagogus*-monkey. Consequently the authors subscribe to an opinion previously expressed by other workers that " there is yet another, more basic cycle responsible for yellow fever maintenance in an endemic area, more fundamental than the monkey-*Haemagogus*-monkey-cycle ". *G. Stuart*

FONTAN, R. & FAURAN, P. Problèmes posés par les foyers résiduels d'*Aedes aegypti* sur le continent américain. **[Problems of Residual Foci of *Aedes aegypti* on the American Continent]** *Bull. Soc. Path. Exot.* 1960, Sept.–Oct., v. 53, No. 5, 892–903. [14 refs.]

A campaign for the eradication of *Aedes aegypti* from the New World was launched by the Panamerican Sanitary Bureau (PASB) in 1947, the chief measures used being the spraying of dwellings and the treatment of actual and potential breeding places with DDT. Eradication was declared complete in Bolivia in 1948, and in French Guiana and the Bermudas in 1953, but at the end of 1959 residual foci of *A. aegypti* were still present in the United States, Mexico, Argentina, Surinam, Venezuela and in a number of islands in the West Indies, providing a potential source of reinfestation.

Reinfestation of French Guiana did in fact take place probably from Surinam, and breeding places of *A. aegypti* were encountered over an area of 4,500 km.^{2} during a period of 2 months in 1959. The larvae showed a significant degree of resistance to DDT. It was noted that the localities in which the mosquito was found were restricted to those served by motorable roads, suggesting that the spread was by means of road vehicles.

A vigorous campaign of spraying with dieldrin was started in May 1959 and neither adults nor larvae of *A. aegypti* were found during an inspection of 3,200 houses made in December. Six months later a second inspection also proved negative.

The authors conclude that (1) eradication of *A. aegypti* on a territorial scale is always difficult, (2) reinfestation by the agency of road vehicles can be very rapid, (3) the spraying of dwellings with a sufficiently active residual insecticide in sufficiently high dosage is the method of choice in an eradication programme, and (4) the final eradication of *A. aegypti* from the New World depends on the rapid elimination of residual foci before resistance to insecticides can develop.

G. Covell

RABIES

HEBERT, H. J. & HUMPHREY, G. L. **Rabies Outbreak in Imperial County.** *Pub. Health Rep.* Wash. 1961, May, v. 76, No. 5, 391–7, 1 fig. & 1 map.

In the Imperial Valley of California and in the neighbouring Mexican State of Baja California del Norte in the Mexicali Valley 438 animals were pronounced rabid and more than 1,000 of the 1,894 persons reporting animal bites received antirabies treatment during the 14-month period 28th August 1959 to 29th October 1960. Of the total animal cases 412 (94%) occurred among dogs—204 (93%) of the 219 rabid animals in Imperial County and 208 (95%) of the 219 in Mexicali. Evidence pointed to the predatory animal population of the valley areas as the source of the outbreak. From 9th September 1959, when the first laboratory-confirmed case of canine rabies in Imperial County was reported, animal rabies gradually increased on both sides of the border to reach a peak incidence in November-December 1959.

To cope with the outbreak the health authorities in California declared Imperial County a rabies area on 2nd December 1959. By such declaration all dogs 4 months of age and older had to be licensed and vaccinated against rabies and dogs under 4 months old to be confined; provision for the collection, impoundment and destruction of stray dogs and for the low-cost vaccination of household dogs had also to be made. On 12th December a quarantine on all dogs was imposed—a measure which remained in effect for the whole county until 14th April 1960 and for the southern portion until 14th June of that year. Violation of the quarantine requirements, including non-vaccination of dogs and failure to control or confine privately-owned dogs, entailed the imposition of severe penalties. From the first week in December 1959 an energetic publicity campaign was continuously conducted through the media of the press, radio and television warning the inhabitants of the danger of rabies and enlisting their cooperation in the application of control measures. Concurrently, control measures for predatory wild life were instituted along the international border and adjacent to the quarantine area: 188 poison-bait stations were set up, with 4,400 baits continuously available. Finally, the construction of gates on the crossings of the All-American Canal to prevent movement of dogs to and from Mexico was completed in mid-January 1960, by which time virtually

all stray dogs in the county had been destroyed, 95–97% of the privately-owned dogs vaccinated, the number of animal bites and the number of dogs submitted for laboratory examination reduced to a mere trickle, and the epizootic was at an end, no animal identified as native to Imperial County having been diagnosed as rabid in the following 11 months.

In Mexicali and in the northern part of Baja California free anti-rabies vaccination of dogs, with 35,000 doses of potent chick-embryo vaccine from the United States, was carried out between 23rd December 1959 and 19th November 1960, during which period 29,867 animals had apparently been immunized. In addition, a limited destruction of stray dogs between November 1959 and March 1960 had reduced the canine population by 5,712, but this control measure, despite its real need, was early abandoned because of adverse public reaction. The fact that there had been no restriction imposed against dogs in the street and no effective reduction in dog population undoubtedly contributed to the continued occurrence of canine rabies in the Mexicali area up to 12th November 1960, in contrast to the abatement of the disease in the Imperial Valley in January 1960.

[See also this *Bulletin*, 1960, v. 57, 701.] *G. Stuart*

Nicolau, S. S. Vaccinuri metalizate (argint, cupru). Nouă metodă pentru prepararea de vaccinuri atenuate contra turbării, encefalitei de căpusă, herpesului, gripei si ornitozei. **[Metal-treated Vaccines (Silver, Copper). A New Method of Preparing Attenuated Rabies, Tick-borne Encephalitis, Herpes, Influenza and Ornithosis Vaccines]** *Studii si Cercetari Inframicrobiol.* 1960, v. 11, No. 4, 489–527. [87 refs.] French summary.

An account is given of further work on the development in Rumania of virus vaccines inactivated with salts of silver and copper [this *Bulletin*, 1959, v. 56, 1231]. Rabies vaccine was prepared as a 10% suspension in 0·15% silver nitrate solution of the brain of a rabbit infected with rabies virus; after standing at room temperature for 24 hours, with shaking for 4–5 hours, an equal volume of 1·8% sodium chloride was added. Mice given 6 intraperitoneal injections of the material with intervals of 2 days withstood intracerebral challenge with 14·6 LD50 of fixed rabies virus, and in further tests the silver vaccine gave protection comparable with that obtained with a standard Fermi vaccine. The vaccine also conferred protection in rabbits. In a similar manner it was possible to prepare vaccines against Russian spring-summer encephalitis, herpes, ornithosis and influenza which gave good protection in mice against infection with the corresponding viruses, and a satisfactory rabies vaccine could also be prepared by inactivating the virus suspension with 0·05% copper chloride or 0·06% copper nitrate. *D. J. Bauer*

Ruegsegger, J. M., Black, J. & Sharpless, G. R. **Primary Antirabies Immunization of Man with HEP Flury Virus Vaccine.** *Amer. J. Pub. Health.* 1961, May, v. 51, No. 5, 706–16.

In previous studies Fox *et al.* [*California Vet.*, 1955, v. 8, 20; this *Bulletin*, 1958, v. 55, 754], as well as Sharpless *et al.* [*ibid.*, 754] had demonstrated not

only the safety but also the feasibility of employing a live, attenuated strain of rabies virus—a high-egg-passage (HEP) Flury—to induce the production of rabies antibodies in man. In the present study further investigations into the use of HEP Flury virus vaccine as an immunizing agent for man were carried out on a number of volunteers from a veterinary school. In the experimental work vaccine with a suckling-mouse LD50 titre of $10^{6.7}$ per ml. was employed. The vaccine was prepared from chick embryo infected on the 7th and harvested on the 16th day of incubation; after homogenization of the harvested embryos (100% suspension) and centrifugation for 20 minutes, the supernatant fluid was diluted to 70% original embryo suspension with casein digest solution and freeze-dried; at the time of use the dried vaccine was reconstituted with sterile water to a volume equivalent to 35% tissue suspension. Serum specimens were taken from each volunteer before vaccination and at intervals ranging from 5 to 190 days after vaccination. Using the challenge virus standard (CVS) rabbit-fixed strain of rabies virus, the authors screened all sera for the presence of neutralizing antibody: a mixture containing 9 volumes of unheated serum and 1 volume of virus (100–300 LD50 per mouse inoculum of undiluted mixture) was incubated for 3 hours at 37°C.; the undiluted mixture was then inoculated intracerebrally into mice. Pre- and post-vaccination sera from each volunteer were ordinarily paired in the same test.

The main experiment was designed to ascertain the effect of the amount of antigen as well as the spacing of injections on the development of immunity. To this end vaccine was injected intracutaneously into 226 volunteers divided into 8 groups. These groups received vaccine as follows: group I (38 persons), 3 injections, each of 0·2 ml., at 5-day intervals; group II (47 persons), 2 injections, each of 0·3 ml., at 5-day intervals; group III (45 persons), 2 injections, each of 0·2 ml., at 5-day intervals; group IV (32 persons), 2 injections, each of 0·2 ml., at 15-day intervals; group V (17 persons), 2 injections, each of 0·2 ml., at 30-day intervals; group VI (16 persons), a single inoculation of 0·6 ml.; group VII (14 persons), 2 injections, each of 0·6 ml., at 15-day intervals; and group VIII (17 persons), 2 injections, each of 0·6 ml., at 30-day intervals. 60 days after the initial injection a survey was made of the antibody response in these groups to determine the need for booster injections: when the 60-day serum showed antibody to be absent or in weak titre, a booster injection was given 5 months after the initial injection, the amount of inoculum being determined by the amount in the initial injection for each group.

The results obtained in this experiment may be briefly summarized. The safety of the vaccine was evidenced by the lack of any systemic reactions and by a paucity of local reactions. The relative efficiency of the several vaccination schedules in stimulating antibody production may be gauged from the following findings. In group I, 36 of the 38 showed antibodies in their sera within 60 days, and 35 within 30 days, of the initial injection; only 1 failed to respond to a booster injection. In group II, only 33 of the 47 developed antibodies within 60 days, but 6 more responded after a booster injection. In groups III, IV and V, respectively, 36 of the 45, 26 of the 32 and 11 of the 17 showed antibodies by the 60th day; moreover a booster dose did not add appreciably to the total of immunes. In group VI, 12 of the 16 showed antibodies within 30 days; 2 of 6 without antibodies on the 60th day failed to respond to a booster dose. In group VII, all 14 had demonstrable antibodies by the 30th day, but 2 lost their antibodies by the 60th day and were not converted to an immune status by a

later booster injection. In group VIII, 16 of the 17 had antibodies by the 60th day, the sole exception showing a minimum response to a later booster injection of 0·6 ml.

In a subsidiary experiment the restimulation of immunity by a single intracutaneous injection of 0·2 ml. of HEP Flury vaccine was studied in 10 persons (group IX), with histories of previous Pasteur treatment. In this group 7 still had neutralizing antibodies in their sera on admission to the study; 2 of the 3 without demonstrable antibody on admission responded satisfactorily within 30 days of receiving the booster injection, even though their primary course of Pasteur treatment had been administered, respectively, 15 and 17 years previously; the remaining person, whose primary course of treatment had consisted of only 5 injections given 12 years earlier, did not respond to the booster injection until the 60th day.

In discussing the results of their study the authors consider that, if neutralizing antibodies do in fact constitute a reasonable index of immunity to rabies, further evidence has been adduced to indicate the prophylactic value of HEP Flury rabies centrifuged vaccine among groups of persons with unusual risks of repeated exposure (such as veterinarians, animal handlers, sportsmen, etc.) and with unusual liability to neuroparalytic accidents from repeated treatment with nervous-tissue vaccines. Whether the Flury vaccine can be used for post-exposure immunization, however, cannot be decided on the basis of presently available evidence, but in this connexion it is noteworthy that in a large number of the vaccinated volunteers antibodies were demonstrable on the 10th, 15th and 30th days after the first injection. Thus, for example, in group I, 32 (84%) of the 38 volunteers had developed antibody by the 15th day after the first injection—an early appearance of antibody essential for the protection of persons who have sustained wounds potentially contaminated with rabies virus. Finally it has again been shown that a single intracutaneous injection of 0·2 ml. of HEP Flury vaccine can activate the basic immunity of a full course of Pasteur vaccine, regardless of the interval since the initial course. *G. Stuart*

Jenkins, J. H., Hayes, F. A., Feurt, S. D. & Crockford, J. A. **A New Method for the Live Capture of Canines with Applications to Rabies Control.** *Amer. J. Pub. Health.* 1961, June, v. 51, No. 6, 902–8, 1 fig. [19 refs.]

Aksel, I. S. & Aykan, T. B. **Growth Behavior of the Rabies Virus in a Glioblastomatous Tumor induced with Methylcholanthrene in Mice.** *World Neurology.* Minneapolis. 1961, May, v. 2, No. 5, 398–405, 3 figs.

A tumour produced by inserting a needle of methylcholanthrene into the brain of a C57 black mouse was serially passaged by subcutaneous and intraperitoneal inoculation into the same strain. The tumour was undifferentiated, with areas suggesting spongioblastoma, oligodendroglioma and ependymoma. Rabbit brain inoculated with rabid dog brain was used as a source of virus. Virus was inoculated into one pole of the tumour in 50 mice. 3 died in 8, 14 and 17 days respectively and Negri bodies were demonstrated in their brains. The majority died 11–28 days after inoculation. The survival time did not differ

from that of mice with uninfected tumours. All mice inoculated with virus intracerebrally died of encephalitis and had Negri bodies. No histological difference was found between infected and uninfected tumours. Eosinophilic inclusions resembling Negri bodies were seen in both infected and uninfected tumours. *C. E. Gordon Smith*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

DOMARADSKII, I. V., IAROMIUK, G. A. & VASIL'EVA, Z. I. **The Relationship between *Pasteurella pestis* and Hyaluronic Acid and on the Presence of a Spreading Factor in this Organism.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1960, v. 31, No. 7, 1332–7, 2 figs. [Translated from Russian.]

"Experiments with reference strains and freshly isolated strains of *Pasteurella pestis* carried out simultaneously with three species of organisms known to contain hyaluronidase enable us to state that *P. pestis* does not possess the enzyme hyaluronidase, which causes depolymerization of hyaluronic acid *in vitro* and increases the area of diffusion of a strain *in vivo*."

BUCKLAND, F. E. & TREADWELL, R. H. **A Comparison of Plague Vaccines by the Mouse Protection Test.** *J. Hygiene.* 1961, Mar., v. 59, No. 1, 49–56.

It was not found to be possible to assay a plague vaccine in terms of its power to protect mice against a standard challenge because, in spite of every precaution in preparing the different batches of challenge suspensions from the same batch of dried seed culture, the relation of the viable count to the LD50 was found to be too variable. When, however, the potency of the vaccines was expressed in terms of a standard vaccine, and a sufficient number of replicate assays were made, it was possible to place the vaccines in a dependable order of immunogenic potency. But this procedure proved to be very time-consuming and involved the use of an almost prohibitively large number of mice since many replicate tests were necessary to offset the great variability of the method itself. The vaccines tested differed greatly in the content of material remaining after dialysis and when equal weights of this material were compared the vaccines prepared from virulent strains were appreciably more protective than those prepared from avirulent cultures. *H. J. Bensted*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

DUTTA, S. P. & SARMA, R. S. S. **Cholera in Pondicherry, 1913–1953.** *Indian J. Public Health.* 1960, Oct., v. 4, No. 4, 194–201, 1 graph. [11 refs.]

The epidemiology of cholera in Pondicherry is discussed on the basis of a study of records covering the 41 years from 1913 to 1953. During this period a total of 10,807 deaths from cholera have been recorded out of a population of rather less than 250,000.

Epidemics of cholera occur at irregular intervals, without any apparent long-term periodicity. The annual cholera wave shows a double rise with a peak in December-March and a smaller one in July-August. There has been a decline in incidence since 1931, the occurrences of severe epidemics having become less frequent.

An account is given of control measures which have been initiated under the first and second All India Five Year Plans. The chief of these is the provision of a safe water supply in rural areas, which should go a long way towards the prevention of epidemics and the eventual eradication of the disease.

G. Covell

MUKERJEE, S. **Diagnostic Uses of Cholera Bacteriophages.** *J. Hygiene.* 1961, Mar., v. 59, No. 1, 109–15. [20 refs.]

The 4 groups of cholera phages, according to the author's scheme of classification [this *Bulletin,* 1958, v. 55, 651] are active over a wide range of host strains but with differences in their lytic spectra for the susceptible cholera vibrios. Group IV phages lysed 100% of the strains of *Vibrio cholerae* whereas group II lysed only 83·8%. El Tor vibrios were quite insensitive to the action of group IV cholera phages and the non-agglutinating vibrios (NAG) were equally insensitive to group II cholera phages. The use of these typing phages offers a reliable method for the differentiation of the cholera and El Tor vibrios in cases where there is uncertainty about the production of haemolysin by a particular culture.

H. J. Bensted

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

ROY, N. K. **Some Observations on the Isolation and Maintenance of *Entamoeba histolytica in vivo* and *in vitro*.** *Ann. Biochem. & Exper. Med.* Calcutta. 1961, Jan., v. 21, No. 1, 1–6.

In order to isolate strains of *Entamoeba histolytica* of human origin for chemotherapeutic studies, inbred rats and mice up to 18 days old were used

before they had consumed solid food. The culture medium used for *in vitro* growth was that described by NAKAYAMA [this *Bulletin*, 1959, v. 56, 611]. The animals were fed directly on an emulsion of freshly-isolated faeces containing a few cysts along with some vegetative forms, and were killed after 6 days. Their caecal contents were then added to culture medium. The same type of medium was inoculated with the suspension of fresh stool which the rats received.

The clinical histories of a number of patients and behaviour of their stools in culture and in subculture are shown in tables. The author observed that rats and mice become infected by oral administration of cysts. After 2 weeks the caecal contents of these animals became infective to other animals but *E. histolytica* did not grow *in vitro*, nor was the parasite present in every sample of fresh stools. Subculture from 3rd to 5th day of culture proved most successful.

[Similar difficulties in culturing *E. histolytica in vitro* have been met with by other authors.] *J. D. Fulton*

MCQUAY, R. M., Jr. **Preliminary Observations on the Encystation of Large and Small Race Strains of** *Entamoeba histolytica in vitro*. *Amer. J. Clin. Path.* 1961, Jan., v. 35, No. 1, 40–43. [18 refs.]

The author describes the results of observations on encystment of *Entamoeba histolytica* and *E. hartmanni* [his "small race"] in cultures, isolated from stools in a diphasic medium and maintained in a liquid medium containing charcoal. Of the 19 strains of the "large race", 3 encysted regularly throughout more than 27 subcultures, one produced cysts in 35% of cultures, and 2 in 76·5% and 79·5%, respectively. There was no correlation between the amount of growth of the amoebae and the number of cysts produced, nor could encystation be induced at will.

As regards the "small race", about 100 strains of which were cultivated, immature cysts were seen in one, and abundant mature cysts in another.

C. A. Hoare

HUSSEIN, Z. H. **The Pathogenicity of** *Entamoeba histolytica*. **I. The Mean Cyst Diameter in Large and Small Race Infections.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 265–71, 5 figs.

This is the first of a series of papers and does not itself deal with the pathogenicity of *Entamoeba histolytica* but with establishing the validity of certain basic concepts with regard to cyst size.

100 cysts from each of 79 patients harbouring *E. histolytica* were measured; 46 persons proved to have the large race and 33 the small. The mean cyst diameters of 78% of the large race group fell between 11·5 and 13·5 μ, and 88% of the small race group between 8·0 and 9·5 μ.

Concentration by the formol ether technique, or storage at 4°C. for up to 26 days, did not materially affect the mean cyst diameters. Second specimens were obtained from 14 patients after an interval varying from 7 to 94 days. The mean cyst diameters on the second occasion did not materially differ from those found at the first examination.

[The author makes a point of there being no overlap in mean cyst diameter

between the two races, but, since the separation of the races depends by definition on the mean cyst diameter being greater or less than 10 μ, any overlap is impossible.] *W. P. Stamm*

KASPRZAK, W. **Some Observations on Strains of *Entamoeba histolytica* isolated from Carriers in Poland.** *Československ. Parasit.* Prague. 1959, v. 6, No. 2, 53–6. [20 refs.]

"Cases of *Entamoeba histolytica* infection encountered in the Dispensary of Parasitic Diseases in Poznań are symptomless. In the faeces of carriers only minuta forms of *Entamoeba histolytica* are found, so we may believe that the amoebae live in the hosts as commensals. Some of the strains, however, may cause acute amoebiasis in guinea-pigs and the intensity of macroscopic changes is sometimes more acute than in the case of Vietnam strains.

"Although it is difficult to state whether the invading factor is in the organism of the parasite itself or in the accompanying bacterial flora, yet we may accept that the potential virulence of Poznań strains isolated from symptomless cases is the same as the virulence of the Vietnam strain isolated from those of acute amoebiasis."

ZAMAN, V. **Studies with the Immobilization Reaction in the Genus *Entamoeba*.** *Ann. Trop. Med. & Parasit.* 1960, Dec., v. 54, No. 4, 381–91, 10 figs. [28 refs.]

VAANDRAGER, K. & GRIMM, J. G. Appendicitisverschijnselen bij amoebiasis. [**Symptoms of Appendicitis in Amoebiasis**] *Nederl. Tijdschr. v. Geneesk.* 1961, July, 22, v. 105, No. 29, 1434–5.

The English summary appended to the paper is as follows:—

"Critical discussion of the case history of a 43-year-old patient with symptoms of appendicitis, who had identical symptoms in the left lower abdomen one week after appendectomy had been performed. He was found to suffer from amoebiasis. Patients whose appendicitis symptoms are not quite typical and from whose past history amoebiasis might be suspected, should first be examined for the presence of amoebae. It is also advisable to examine removed appendices for the same purpose."

DE LA CRUZ, H. E., OLIVEROS, Alice & NEQUIN, R. **Tetracycline and Novobiocin in the Treatment of Amoebic Dysentery in Children.** *J. Philippine Med. Ass.* 1961, Mar., v. 37, No. 3, 161–9. [18 refs.]

Reluctant to use emetine for the arrest of acute amoebic dysentery in children, on account of its "well known serious side effects", the authors used a combination of tetracycline and novobiocin (Albamycin-T) in such cases. The drugs were combined in tablet form, each tablet containing 125 mgm. of each antibiotic. 52 children, aged between 2 and 10 years, all passing "cysts [*sic*] and/or trophozoites in the stools" were given 30 mgm./kgm. body weight

of the combined drugs daily in 3 divided doses. The treatment, where possible, continued during 10 days.

90% of the children were relieved of their dysenteric symptoms within the first 3 days of the treatment, and the remainder at latest before the end of the 10-day treatment, if this was reached. The stools of all were cleared of parasites during the first 7 days. Only 21 of the children completed the full 10-day course, though this failure to complete the course [apparently] was not due to side effects of the treatment, which took the form of an urticarial eruption in only 2 patients.

The authors therefore consider that this form of treatment for acute amoebiasis in children is satisfactory.

[In view of some of the statements in this paper some doubt must arise as to whether the patients' symptoms in all these cases were solely or even primarily due to intestinal amoebiasis.] *A. R. D. Adams*

CALUBAQUIB-STA, P. F. & ROLDA, H. T. **Treatment with Glaucarubin of Amebic Carriers among Food Handlers.** *J. Philippine Med. Ass.* 1961, Mar., v. 37, No. 3, 152–5.

Since 1959 the authors have been responsible for the treatment of food handlers found to harbour an intestinal *Entamoeba histolytica* infection on routine examination by the Manila Health Department. They treated them with a 10-day (12 patients) or a 5-day (120 patients) course of Glaucarubin (150 mgm. daily) [see this *Bulletin*, 1956, v. 53, 995]. They also observed 17 infected patients as controls; these were given a placebo. Results are set out in a table; from this it appears that all given Glaucarubin were parasitologically cured, but in addition "20%" of the untreated controls were self-cured in the same period. The authors state that "No satisfactory explanation as yet has been offered for this phenomenon" [the table shows that before treatment 3 of 20 in the placebo group were negative and after treatment 4 were negative: it is not clear whether the same persons are concerned, but if they are then it would appear that only 1 was "self-cured"]. *A. R. D. Adams*

WATSON, K. C. **Survival of Bacteria in Amoebic Hepatic Pus** *in vitro*. *J. Hygiene*. 1961, June, v. 59, No. 2, 161–9. [12 refs.]

It would appear to be a reasonable assumption that intestinal organisms, as well as amoebae, can penetrate the damaged bowel mucosa and reach the liver *via* the portal radicles, yet pus obtained by needle aspiration of amoebic hepatic abscesses is usually sterile when cultivated for bacteria. This failure to find organisms in such abscesses suggests that liver pus might exert an inhibitory action on a number of bacteria.

To investigate this hypothesis the author conducted a number of experiments by mixing bacteriologically sterile pus from a hepatic abscess with suspensions of various organisms, mostly intestinal, and incubating the mixture at 37°C. under appropriate atmospheric conditions. At intervals of time up to 5 days aliquot amounts were removed and surface viable counts performed.

Although small inocula of certain organisms were inhibited or rendered sterile, other organisms increased in number. The pus itself apparently did not

possess sufficient bacteriological activity to account for the low rate of infected abscesses.

Addition of complement did not result in any greater inhibition, and it is suggested that an antibody-complement system effective against Gram-negative bacteria does not play an important role *in vitro*.

The wall of a hepatic abscess consists of a zone of dead but intact liver cells with a ragged necrotic lining devoid of blood. There is often a zone of compact reticulum due to necrosis of the liver cells and collapse of the reticulum framework. It is suggested that this avascular region presents an adequate barrier to passage of organisms into the abscess cavity. Secondary bacterial infection is often endogenous, occurring after primary aspiration owing to disintegration of the wall of the cavity, which allows entrance of portal blood containing organisms from the damaged bowel. *P. A. Clearkin*

LAMY, L. *Dientamoeba fragilis*: recherche, culture, fréquence, intérêt et caractères pathogènes. [**Studies on** *Dientamoeba fragilis*] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 505–9.

New observations on *Dientamoeba fragilis* are reported, based on examinations of faecal specimens of patients in Paris, and on the behaviour of this organism as seen by cinematography. It grows abundantly in culture media, *e.g.* on serum, Ringer serum, Ringer egg and starch, and requires subculture every 5 days at 37°C. The organism was recovered 44 times in 2½ years (during which period *Entamoeba histolytica* was found 26 times). Its pathogenicity to man is still not completely certain but when the appropriate bacterial flora accompanies the infection, *D. fragilis* may initiate marked abdominal symptoms.
P. C. C. Garnham

FAUST, E. C., GIRALDO, L. E., CAICEDO, Gladys & BONFANTE, R. **Human Isosporosis in the Western Hemisphere.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 343–9, 13 figs. on pl. [57 refs.]

Isosporosis is defined as an infection with species of the coccidian genus, *Isospora*, of which *I. belli* and *I. hominis* are the representatives in man. They are believed to parasitize the submucosa as well as the mucosa of the intestinal wall. Human isosporosis is cosmopolitan but, like amoebiasis and giardiasis, is more common in tropical and subtropical climates. It is stated that during World War I epidemics developed in the Near East and during World War II in the south-west Pacific Islands, in the military forces. In MAGATH'S summary [this *Bulletin*, 1935, v. 32, 660], 75% of the total (200) originated in the Near East and the remainder in the Far East, Africa and the Americas. With rare exceptions, the organism was referred to as *I. hominis*, but today the difference between the two species is well established. Much more information has since accumulated concerning the distribution of *Isospora* infections, especially in the Americas. Up to the present 835 cases of human isosporosis have been reported from the Western Hemisphere [these are tabulated]. In the Parasitology Laboratory of the University of Valle, Cali, Colombia, 30 persons have been found infected with *I. belli* and 12 with *I. hominis* during the last 3½ years. Only 3 of the former and 2 of the latter were diagnosed from direct faecal films. In contrast only one of the total was negative by the zinc sulphate

centrifugal flotation technique. Generally, many of the infected persons reported have been under 10 years old and several have been infants: the infection is commoner in the poorer classes. In Cali it has been exceptional to observe *Isospora* in stools of patients for more than 2 successive days.

Faeces collected from dogs in the most heavily infected human area in Cali were examined. The incidence percentage of *Isospora* was as follows:—*I. belli*, 0·37, *I. hominis*, 24·6, *I. bigemina* var. *canis*, 3·41, and *I. felis*, 0·57. Infection with *I. belli* and *I. hominis* in this animal appears as unstable as in man. Cats, which are uncommon, were not examined. Rats and mice trapped in the homes of infected persons yielded species of *Eimeria* in 63 and a single *I. belli* in a Norway rat.

Human isosporosis is present in many areas of Latin America and also in several localities in the south-eastern United States and in southern California. It is certain that isolated reports and the lack of diagnosis of *I. belli* and *I. hominis* in parasitological surveys in other Latin American countries probably do not represent the true situation. Failure to discover these parasites is probably due to inexperience in recognizing the organism, the omission of a suitable technique for concentrating the cysts free of faecal debris, and inadequate sampling. It is estimated that the percentage of human isosporosis in Brazil is 0·1 ; in Cali, Colombia, 1·0 and in Santiago, Chile, 1·8.

The only published report of high incidence was an epidemic in a North American institution for mentally handicapped children [JEFFERY, *ibid.*, 1959, v. 56, 302], where the percentage of infection was 18 in the children and 41 in the employees.

It is curious that whereas in Cali both species occur, in Santiago, where the majority of cases have been discovered, only *I. belli* has been identified. As domestic animals do not seem to be satisfactory reservoirs an explanation is put forward based on experimental evidence of the resistance of the cystic stages of these coccidia to unfavourable environmental conditions; in this respect *Isospora* infection parallels amoebiasis and giardiasis. *Philip Manson-Bahr*

YAWS AND OTHER TREPONEMATOSES

i. HACKETT, C. J., with the collaboration of an International Group of Experts on Yaws and Participants at the International Conference on Yaws Control, Enugu, Nigeria, 1955. Nomenclature internationale des lésions pianiques. [**An International Nomenclature on Yaws Lesions**] *World Health Organization Monograph Series No. 36*. 103 pp., 34 figs. on 76 pls. [45 refs.] 1958. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [20s.; $4.00; Sw.fr. 12.–.]

——. Nomenclature internacional de las lesions del pian. *Ibid.*

——. Nomenklatur internasional untuk gedjala-gedjala penjakit framboesia. *Ibid.* 111 pp. 1960. Djakarta: United Nations Children's Fund.

ii. Hackett, C. J. & Loewenthal, L. J. A. Le diagnostic différentiel du pian. **[Differential Diagnosis of Yaws]** *World Health Organization Monograph Series No. 45.* 88 pp., 52 figs. on 52 pls. [37 refs.] 1961. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [17s. 6d.; $3.25; Sw.fr. 10.–.]

—— & ——. Diagnostico diferencial del pian. *Ibid.* 1960.

i. These 3 volumes are French, Spanish and Indonesian versions of WHO Monograph No. 36 [this *Bulletin*, 1958, v. 55, 656].

ii. These 2 volumes are French and Spanish versions of WHO Monograph No. 45 [*ibid.*, 1961, v. 58, 203].

So wide is the international scope of yaws campaigns that translations of these excellent monographs will be very welcome throughout the areas where that disease is still a problem. WHO has been particularly enterprising in publishing a translation for use in Indonesia where so much intensive work in yaws has been done. *H. J. O'D. Burke-Gaffney*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

All India Leprosy Workers' Conference: Indian Ass. of Leprologists. **Bombay Conference, 15–18 Dec., 1959.** *Leprosy in India.* 1960, Jan., v. 32, No. 1, 1 graph & 2 diagrams. [17 refs.]

These two bodies held their joint conference in Bombay, the former dealing with the scientific and the latter with the more general aspects of leprosy. The conference was attended by about 600 delegates from India, the majority being from the State of Bombay, and 7 from outside India.

Reference was made to the Government of India's third 5-year plan. In the first two plan periods the Government sanctioned the establishment of subsidiary Leprosy Control Centres and Study-*cum*-Treatment Centres. Each of these was expected to deal with a population of 50 to 60 thousand in areas with a leprosy incidence of 1% or more. In the third 5-year plan it is proposed to carry out schemes for training, rehabilitation, etc. It is hoped by the end of the second period to have 100 units, and to add 150 more in the third period. It is also hoped to establish two rehabilitation centres, one in the north and the other in the south. It is calculated that 4,600 para-medical and 1,900 social workers should be trained for the third 5-year period.

The main topics discussed at the conference were control, social aspects and rehabilitation. Papers were read on electron microscope study, metabolic aspects, education, and many other topics; abstracts of some of these are included in the third part of the Report. A number of resolutions were proposed and adopted. *Ernest Muir*

MONTESTRUC, E. Lépreux d'hier et d'aujourd'hui. [**Leprosy Patients in the Past and Today**] *J. Méd. de Bordeaux*. 1961, June, v. 138, No. 6, 737–48.

The author gives a brief history of leprosy and its recognition in the ancient Vedas of India as the oldest of all diseases. He refers to the abhorrence with which it always has been, and still is, regarded, and the consequent sufferings of those afflicted with leprosy.

An account is given of the effects of treatment in the last 20 years, and special mention is made of the world-wide travels of Raoul FOLLEREAU to visit leprosy institutions and his establishing the World Leprosy Day. In 1960 this day was commemorated by 88 nations. *Ernest Muir*

MCFADZEAN, J. A. & MACDONALD, W. W. **An Investigation of the Possible Role of Mosquitoes and Bed Bugs in the Transmission of Leprosy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 232–4.

A review is given of reports that acid-fast bacilli have been found in insects [this *Bulletin*, 1960, v. 57, 481], and that mosquitoes which had been fed previously on a lepromatous patient could produce a microlepromin reaction, and that *Mycobacterium leprae* were found in the skin of that patient after a second feed.

This paper describes experiments with *Aedes* mosquitoes and bedbugs to find if they can take up *Myco. leprae* from the skin of a lepromatous patient, and whether they can produce a microlepromin reaction. The insects, isolated in specimen tubes with the openings covered with gauze, fed readily through the gauze first on lepromatous and then on tuberculoid-type patients. It was found impossible to locate acid-fast bacilli in dissected mosquitoes because of the acid-fast qualities of many of the insect tissues. Thus positive findings reported in the past should be viewed with caution. "In the first experiment significant nodules (3 mm.) resulted from some of the bites of mosquitoes which had fed previously on a patient with lepromatous leprosy. These nodules persisted for 72 hours. There was, however, practically no reaction to the bites of the control mosquitoes. This was the only case in which there were significant differences between the bites of 'infected' and control mosquitoes. In numerous replicates of the experiment on other patients no differences were observed between the reactions of the two groups of mosquitoes: in all these experiments, nodules were produced in patients with positive lepromin reactions following most of the bites of both 'infected' and control mosquitoes. The nodules usually persisted for 72 hours and no reactions were found at 7, 14 and 21 days. Biopsy examinations of the biting sites were made after 72 hours and after 25–28 days, and the histology showed virtually normal skin with a few lymphocytes and no acid-fast bacilli."

Patients with lepromatous leprosy showed no delayed reaction to mosquito bites, in contrast to those with the tuberculoid form and healthy volunteers: it is suggested that this finding may parallel the absence of a lepromin reaction in patients with lepromatous leprosy. Whether or not a mosquito has had a previous blood feed does not influence the size of the delayed reaction to their bites in healthy volunteers. *Ernest Muir*

Diop, M., Louvain, M., Basset, A. & Collomb, H. Maladie de Hansen. Forme multinévralgique pure évoluant depuis 15 ans. [**Hansen's Disease. A Pure Multi-neuralgic Form extending over 15 Years**] *Bull. Soc. Méd. Afrique Noire Langue Française*. Dakar. 1961, v. 6, No. 1, 110–13. [20 refs.]

Leprosy is primarily a nerve disease, cutaneous only secondarily. If this idea is not grasped there are apt to be mistakes in diagnosis. After making these statements the authors describe the case of a patient who suffered from leprosy for 15 years not only without any cutaneous lesions but without any objective neurological troubles or changes in the nerve trunks [being recognized?]. The patient came complaining of more or less diffuse pains in the limbs brought on by cold, which had originated 15 years before. There were dull pains in the forearms and hands like electric shocks passing down to the tips of the fingers and similar pains in the legs and feet. This would confine him to bed for 10 days, after which he would resume his usual activities. These symptoms were worst in the cold weather or when he touched anything cold. They were relieved by raising his hands or feet and recurred when he lowered them. These pains came on every year, sometimes in all his limbs, at other times in one or two. There were no other symptoms.

He had no family history of leprosy. On examination, apart from pityriasis versicolor of the face there were no cutaneous signs. The right ulnar nerve was thickened and irregular and pressure on it failed to produce the usual response in the last 2 fingers. The right median nerve also appeared thickened, and so were branches of the right radial nerve. The remarkable factor was that there was no motor or sensory change in the distribution of these nerves. There was occasional diminution of pain sensation in the right auricular, but this nerve appeared to be thinner than that of the other side. Biopsy of nerve branches confirmed the diagnosis of leprosy, showing caseation, sclerosis and tuberculoid follicles.

It is stated that pure neural leprosy without other signs is comparatively common, and to confirm this a list is given of other workers who have found this. In endemic countries where there are nerve pains without outward objective signs the nerve trunks should be systematically examined. The absence of objective signs in this case is explained by abnormal innervation, which is known to occur in the hands in 20% of people [this *Bulletin*, 1959, v. 56, 445; 1960, v. 57, 137], or by nerve supply being passed through nerve anastomosis from a healthy nerve above or in the neighbouring skin.

Ernest Muir

Reynaud, J., Languillon, J. & Pineau, R. Manifestations rhino-pharyngo-laryngées et localisations osseuses maxillo-nasales de la lèpre. [**Leprous Manifestations in the Nose, Pharynx and Larynx, and Foci in the Nasal Surfaces of the Maxillae**] *Méd. Afrique Noire*. Dakar. 1961, May 1–15, v. 8, No. 9, 185–7, 5 figs.

The results are given of the clinical examination of the mucous surfaces of the nose, pharynx and larynx of 142 leprosy patients, and of the radiological and clinical examination of 79 leprosy patients.

The results in the former group are shown in tabular form, the cases being

divided according to whether they are tuberculoid, lepromatous or indeterminate. The lesions in the nose are divided into: atrophic and crusted, atrophic simple, nodular (ulcerated or not), with perforated septum, stenosed or with hypertrophic congestion. The laryngeal and pharyngeal lesions are divided according to their location. Lesions are again subdivided according to whether they are typical of leprosy or are caused by intercurrent or complicating factors. As the result of specific treatment respiratory and vocal trouble was very infrequent among the patients examined. Contrary to classical descriptions, the pharynx was the part of the upper respiratory tract least affected; but the back wall of the pharynx was often modified, with the mucosa dry, pale and sticky; however, nodules or their scars appeared in only 8% of patients.

In the second group of patients a 3-fold radiographic examination was made: (a) for the nasal bones, for the septum and the anterior nasal spine; (b) for the contour of the face and the nasal fossae; (c) with a retro-alveolar film for the teeth and alveoli. The lesions found are described in detail. The bone destruction in the nose was chiefly in patients with long-standing lepromatous disease, but there was atrophic absorption of bone in some patients with the tuberculoid form. In some patients there was atrophy of bone around the teeth.

The paper ends with the hope that with the progress of antileprosy treatment it may be possible to perform plastic repairs of these parts, but it is important to examine carefully the state of the nose and sinuses and to give local treatment for rhinitis before undertaking such operations. *Ernest Muir*

Dang-Vu-Hy & Tu-Cao-Phan. Zur Novocain-Behandlung lepröser Reaktionszustände. [**Treatment of Lepra Reaction with Novocain**] Reprinted from *Dermatologische Woch.* 1961, v. 143, No. 6, 144–8. [24 refs.]

This paper concerns itself with the treatment of lepra reactions. The generally accepted modern method with antimony compounds is dismissed as being uncertain and unsatisfactory.

With corticotrophin and cortisone the great majority of patients have not reacted satisfactorily. Several authorities have reported deterioration and the stimulation of intercurrent diseases. Cortancyl, which is better tolerated, may instigate water retention and can reactivate dormant tuberculous disease.

These workers, from Hanoi, Vietnam, employed Novocain solution [shown in the text as 10%, but in the summary as 1%], from the initial manifestations, in daily doses of 10 ml. intramuscularly in 43 patients. When it is administered intravenously violent reactions may ensue.

After the defervescence of fever the injections are given at 4–5 days' interval. Controls consisted of 50 patients treated without Novocain. It was definitely shown that Novocain shortened the febrile reaction to 5–6 days as compared with 20–21 days in the control group.

In the erythema exudivatum multiforme, a form of erythema multiforme, skin lesions vanished on an average in 7 to 8 days as compared with 20–25 in the control group.

The comparative cheapness of the drug is another consideration.

In a previous study in Vietnam the treatment with antihistamines was considered. With these the temperature fell in 5 to 6 days and the skin eruption

disappeared after 7 to 8. But Novocain is superior on account of the absence of side effects. *Philip Manson-Bahr*

MUKHERJEE, N., GHOSH, S., GHOSAL, P. & KUNDU, S. **Therapeutic Evaluation of Bacterial Conversion in Lepromatous Leprosy: a Comparative Study with Sulphone and Hydnocarpus Oil.** *J. Indian Med. Ass.* 1961, May 1, v. 36, No. 9, 396–8.

A comparison is made between hydnocarpus oil and sulphone in bringing about conversion of lepromatous leprosy to bacteriological negativity, treatment being conducted at an out-patient clinic. The effect of sulphone in producing bacteriological reduction was about 3 times greater than that of hydnocarpus oil in the first year of treatment. Thereafter the effect was not even double. After 7 years of treatment sulphone could reduce the bacteriological positivity to 17%, while hydnocarpus oil could do so only to 42%. After 7 years' treatment sulphone could bring about absolute negativity in 55% of cases, hydnocarpus in only 26%. It has been found that patients seldom attend out-patient treatment for 7 years. *Ernest Muir*

MCFADZEAN, J. A. & RIDLEY, D. S. **Studies on the Inoculation of *Mycobacterium leprae* into Monkeys.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 235–8.

It had been found that sublethal doses of X-irradiation enhance *Mycobacterium lepraemurium* infections in mice, substantially reducing the apparent generation time of that organism. This suggested the experiments here described. In the first experiment 3 irradiated and 2 control monkeys received measured amounts of *M. leprae* intravenously, and the numbers of bacilli found in the liver 17, 35 and 70 days later were counted. At 35 days there were many bacilli in liver sections of the control animals, but relatively few in the irradiated animals. At 70 days, however, bacilli were scanty in the controls and much more numerous in the irradiated animals.

In the second experiment 6 irradiated and 4 control monkeys were given measured amounts of bacilli intravenously. An irradiated animal killed after 24 hours showed large numbers of bacilli in the liver, but all the others died at 2 to 16 days and no bacilli were found in their livers. It is concluded that irradiation probably delays the uptake of bacilli by the reticulo-endothelial system.

In another series of experiments irradiated and control monkeys were inoculated intradermally in serial sites with measured amounts of bacilli, living in some sites and heat-killed (as controls) in others. Biopsies of the inoculation sites were made after 24 hours and then at weekly intervals. In the lesions with live bacilli after 24 hours all the bacilli had been ingested by phagocytes and there was infiltration with polymorphs. After a week all the polymorphs had disappeared and were replaced with lymphocytes. After 2 weeks the granuloma had become focalized and epithelioid cells had appeared. Between the first and sixth weeks in some animals there was a reaction with necrosis, and polymorphs again appeared. At the 6th week the granuloma consisted of epithelioid cells, lymphocytes and occasional giant cells. Thereafter there was gradual diminution of the lesion, epithelioid cells being replaced by lymphocytes. The nerves were not affected. In lesions with dead bacilli the phagocytic

reaction was less severe, but otherwise it was the same as with the living bacilli. In the irradiated animals the lymphocyte infiltration was suppressed, and probably the disappearance of the bacilli was delayed; this was associated with better formation of foam cells. *Ernest Muir*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES *(schistosomes, other flukes);* CESTODES *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* NEMATODES *(hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

PITCHFORD, R. J. & GELDENHUYS, P. J. **Bilharziasis in the Transkei and Eastern Cape Province.** *South African J. Lab. & Clin. Med.* 1960, Dec., v. 6, No. 4, 237–46, 1 map.

The survey described herein was carried out to complete the knowledge of schistosomiasis in the Transkei and Eastern Cape Province; it covered the north-eastern districts of the Transkei and 5 districts of the Eastern Cape Province as far south as Knysna. In the Transkei, African and Coloured school children were examined by rectal biopsy, a method which, however, proved unsuitable for adults. 13 schools were examined in the 4 districts of Bizana, Flagstaff, Lusikisiki and Port St. John's. 1,173 children were seen of whom 126 had *Schistosoma haematobium*, 5 had *S. haematobium* and *S. mattheei*, 4 had *S. mattheei* only and 1 had *S. haematobium* and *S. mansoni* (this child came from Natal). In general the disease in the 4 districts of Transkei is patchy in distribution and is found mainly in low-lying watercourses. Snails were few in number during the survey and scattered in distribution. In the few oxen and sheep examined moderate infections of *S. mattheei* were found.

During the survey of Eastern Cape Province, urines only were examined, of African and Coloured children. 1,347 samples were examined in 5 districts, East London, Kingwilliamstown, Uitenhage, Humansdorp and Knysna, and of these only 9 were positive for *S. haematobium* and 1 for *S. mattheei*. "In the East London district the disease was found very rarely and was in all probability not endemic. In the Kingwilliamstown and Uitenhage districts it has been decreasing over the past 10 years and very few parasites were found. In the Humansdorp district no infected livestock or humans were found. . . . No evidence of the disease was found in the Knysna district." The southern limit of *S. haematobium* in S. Africa is probably the Swartkops river or the Elands river, while that of *S. mattheei* is probably still Humansdorp.

In the concluding recommendations for controlling the disease it is stated that molluscicide campaigns or environmental control by preventing access to waters should not be introduced. In the Eastern Cape Province, intensive treatment of positive children would eradicate the disease, though in some cases even this measure was unnecessary as the disease seems to be dying out. In the Transkei, however, there was no evidence that the disease was decreasing, and in some areas it was common. *J. J. C. Buckley*

ROUFFILANGE, F., JAUPITRE, M., TOUDOIRE, A. & DESCHIENS, R. La photocinématographie endoscopique dans le controle de la bilharziose urinaire. **[Colour Cinemaphotography used in Endoscopy for the Clinical Control of Urinary Schistosomiasis]** *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 991–6, 8 coloured figs. on 2 pls.

Cystoscopy is recognized as of much assistance in the diagnosis, and also in the determination of success of treatment, of bladder schistosomiasis. Colour photographs of the bladder obtained endoscopically therefore afford a valuable and permanent record of the changes taking place there. In this paper are reproduced some good colour pictures obtained by this means; these indicate the types of lesion seen in schistosomiasis; some lesions of other causation are also displayed to indicate points in differential diagnosis. *A. R. D. Adams*

SALEM, H. H., SHERIF, A. F., ABD-RABBO, H., MORCOSS, W. & EL NINNY, H. M. **Further Therapeutic Trials with Antimony Dimercaptosuccinate in Schistosomiasis.** *J. Egyptian Pub. Health Ass.* 1961, v. 36, Nos. 1/2, 39–62.

This drug, usually referred to as TWSb, is available in 3 different forms; namely the potassium, the magnesium and the sodium salts. These salts do not differ significantly in therapeutic activity or toxicity, though the authors think that the potassium variant may give the most rapid and lasting therapeutic response. They now report on the treatment of 324 Egyptian patients (aged between 5 and 65 years) suffering from schistosomiasis (91 *Schistosoma haematobium*, 98 *S. mansoni*, and 135 both parasites) with one or other of these preparations. In nearly half these cases the magnesium salt was used [but the reports do not indicate which salt was used in individual cases or the results obtained with each]. The gross dosage of the sodium salt was 20 cc., given either intravenously or intramuscularly as convenient, of a solution divided into equal daily doses over 4 or 5 days; the solution used contained 0·1 gm. TWSb in each cc. so the total of TWSb was 2·0 gm., or 500 mgm. Sb.

Material side effects of the treatment, usually slight, were evident in 40% of the patients. Of these vomiting was most common; fever was evident less frequently; occasionally there were colic and diarrhoea. The usual immediate accompaniments of tartar emetic treatment (cough, chest discomfort, joint pains, etc.) were notably absent. In 2 patients diarrhoea, vomiting and fever were so marked that they resulted in severe dehydration and the patients died; these were the only therapeutic fatalities and they involved girls of 15 and of 16 years of age respectively, both of whom initially were in poor condition. The authors consider that their condition should have been improved before antimony treatment was considered; if already begun it should have been stopped until the fluid and electrolyte imbalance had been corrected. Subsequently, patients who developed gastrointestinal side effects were given pantothenic acid to forestall such developments, apparently with benefit. In some patients with concurrent infections, such as amoebiasis, exacerbation in activity of these was noted as a consequence of the TWSb treatment; a watch for such complications is advocated.

Immediate and repeated examinations, for up to a year in 174 patients, led

the authors to the conclusion that TWSb is a highly efficient drug in the treatment of both the forms of schistosomiasis endemic in Egypt; the cure rate in *S. haematobium* infection they assessed at 87% and in *S. mansoni* 82%; in mixed infections it was 70%. *A. R. D. Adams*

DAVIS, A. **Intensive Treatment of Bilharziasis with TWSb.** *East African Med. J.* 1961, Apr., v. 38, No. 4, 157–64. [17 refs.]

Rapidity in time of treatment has obvious advantages when dealing with schistosomiasis in primitive populations. 19 male African children or adolescents in the Nairobi area, all passing many schistosome eggs (3 patients *Schistosoma haematobium*; 4 *S. mansoni*; and 12 both species) but apparently free from other diseases, were treated intensively with TWSb. The gross dosage in individual cases ranged from 1·0 to 2·0 gm.; it was divided into 3 to 5 doses, one dose being given intravenously each day of the treatment period. The maximum daily dosage was 500 mgm. and the minimum 200 mgm.; the weights of the patients ranged from 25·8 to 57·1 kgm. The patients were examined in detail, including blood urea levels, liver function tests, a chest X-ray examination, and electrocardiogram [ECG] before treatment; they were observed daily throughout treatment; and further detailed examinations were made 10, 28 and 54 days after treatment; additionally, rectal biopsies, hatching tests and other means of search for eggs were undertaken every 4 weeks for 4 months.

Side effects of the treatment were severe; vomiting was the most common (17 patients), anorexia (16) and nausea (15); there was a rise in temperature in 13 patients; prostration, listlessness and depression occurred in 10 patients; headache in 7; and epigastric pain with enlargement and tenderness of the liver in 6 patients. Infrequently there was a cough, but this was not associated with the actual injection; occasionally there were pain in the shoulders, vertigo, syncope and backache. Only one patient did not suffer symptomatic side effects of the treatment. The ECG changes will be reported in detail elsewhere, but broadly they did not differ from the pattern seen in the patients getting heavy antimony dosage. 10 of the 15 patients with *S. haematobium* infections, as judged by the tests adopted, were cured of their infections; only 4 of 14 patients with *S. mansoni* infections adequately followed up were cured (2 defaulted). In spite of this, clinical relief was marked in all patients.

The author concludes that whereas a dosage of 2 gm. of TWSb gives a satisfactory rate of cure in cases of *S. haematobium* infection, it is disappointing in *S. mansoni* infections. The considerable side effects of the intensive TWSb treatment he adopted render it unsuitable for ambulant patients.

A. R. D. Adams

AWWAAD, S., ATTIA, M. & REDA, M. **The Effect of TWSb on the Electrocardiogram of Children suffering from Urinary Bilharziasis.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 365–9, 2 figs. [13 refs.]

In mice the acute toxicity of TWSb is reported to be only one-fiftieth that of tartar emetic, and one-tenth that of Fuadin. In its first clinical trial its freedom from serious toxicity both to adults and children was considered to be notable

in that there were no circulatory disturbances and no development of significant electrocardiographic [ECG] irregularities [this *Bulletin*, 1955, v. 52, 56].

17 children (aged 6 to 13 years) with urinary schistosomiasis were treated in Cairo with TWSb; it was administered intramuscularly in 5 doses given daily, on alternate days, or twice weekly, to a total of 0·04 mgm./kgm. of body weight. ECG tracings were made before and during treatment and at one and 4 weeks thereafter. Some of these are reproduced. Marked ECG changes similar to those attending tartar emetic and Fuadin treatment occurred in every child; they were least in the children given the drug twice weekly, though this scheme of dosage proved as therapeutically effective as did the others. Twice-weekly dosage is therefore considered by the authors to be safer than are the more condensed forms of treatment. [The number of patients on which these conclusions are based is very small.] *A. R. D. Adams*

Larivière, M., Hocquet, P. & Michel, R. Étude de l'activité du para-aminophénoxy-1-phtalimido-5-pentane (6171 RP) sur les bilharzioses humaines à *S. haematobium* et *S. mansoni*. [**Activity of Para-amino-phenoxy-1-phthalamido-5-pentane (6171 RP) in** *Schistosoma haematobium* **and** *S. mansoni* **Infections**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 996–1010.

Some trials of this drug in the treatment of schistosomiasis of man have already been reported [this *Bulletin*, 1960, v. 57, 49; 1961, v. 58, 701]. The present authors now record the results of its use in the treatment of 25 patients infected with *Schistosoma haematobium* and 26 with *S. mansoni*. The former patients were adolescent male Africans in Dakar; the latter were young children. The drug was given orally twice daily for 6 days in tablet form, in some cases enteric-coated, to a total of 300 to 400 mgm./kgm. of body weight. In the case of the patients infected with *S. haematobium*, urines were examined weekly for 2 months, and in 23 of the 25 cases re-examination of the urine was possible at a 6-month period. In the patients infected with *S. mansoni* the re-examinations were also carried out for a 6-month period.

The enteric-coated preparation was better tolerated than the simple tablets, which often caused nausea and sometimes vomiting and abdominal pain; these side effects were lessened by giving an antihistaminic drug; evidence of visual changes attributable to the drug was dubious. Of the 25 adolescents with *S. haematobium* infections 23 remained under observation after 6 months; 10 of these could be claimed to be cured as a result of the treatment. Though the enteric-coated tablets were the better tolerated they gave a lesser cure rate than did the plain tablets. Only one of the 26 children with *S. mansoni* appeared to be cured by the same treatment. *A. R. D. Adams*

Naeye, R. L. **Advanced Pulmonary Vascular Changes in Schistosomal Cor Pulmonale.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 191–9, 10 figs. [28 refs.]

5 patients with pulmonary involvement due to *Schistosoma mansoni* infection came to autopsy. All 5 had schistosomal hepatic cirrhosis, and all had oesophageal varices; 3 of them had suffered haemorrhages which proved fatal. Of the

5 patients 2 had shown clinical evidence of pulmonary hypertension ; the other 3 had had few symptoms of respiratory or of cardiac disorder. At autopsy 3 of the patients proved to have right ventricular hypertrophy and dilatation, with dilatation of the pulmonary arteries and visceral congestion. Details of the clinical, and of the autopsy, findings in each case are set out in a table.

The author particularly studied the lung lesions ; by camera lucida drawings of serial sections he reconstructed the vascular anatomy of individual lesions. Disintegrating ova were observed outside the vessels in all 5 cases, the greatest number of these being found in the patient with the fewest pulmonary arteriolar lesions ; conversely the most marked pulmonary vascular lesions were seen in the patient in whose lungs fewest ova were recognized. Around a small proportion of the ova there was a wide granulomatous reaction, sometimes with angiomatoid areas. The angiomatoid channels in these lesions were always found to be disposed around ova. This particular type of angiomatoid lesion lies outside the pulmonary bed ; therefore it does not necessarily interfere with the pulmonary vascular flow.

Another, and more widespread, type of angiomatoid lesion is one in which there is internal endothelial proliferation with fibrosis actually within the vessels of the pulmonary arterial bed and restricted to it ; there is consequent impediment of the vessels in it ; there is an angiomatoid lesion consisting of angiomatous channels in a plexiform pattern in connective tissue. This lesion is dissociated from the presence of a schistosome egg. This latter type of angiomatoid lesion is that which essentially is associated with pulmonary hypertension and cor pulmonale. Its pathogenesis has not been established. It may be due to recurrent pulmonary embolism or thrombosis and repeated recanalization of the thrombi. In patients with schistosomal cor pulmonale there may always be hepatic cirrhosis with portal hypertension, as was the case in the 3 patients of the current series. In 2 of the latter there was evidence of old or of recent portal venous thrombosis ; patent spleno-renal anastomoses could have allowed the passage of emboli from the portal system to the lesser circulation.

The necrotizing pulmonary arteritis noted in 2 of these patients may have resulted from the pulmonary hypertension, rather than have been the cause of it ; or it may be a reaction to worm products. None of the pulmonary arteriovenous fistulae described by other workers in schistosomal cor pulmonale was found in the author's cases. *A. R. D. Adams*

COUTINHO, A. A insuficiência hepática na esquistossomose mansônica, forma hepato-esplênica. [**Disordered Liver Function in** *Schistosoma mansoni* **Infection; Hepato-Splenic Form**] *Anais Facul. Med. Univ. do Recife*. 1959, June. v. 19, No. 1, vii, 9–34. [Numerous refs.] English summary.

70 persons, 29 of them males, whose ages ranged from 9 to 54 years [the age of the youngest is given as 7 in the text], in-patients in the medical clinic of the University of Recife, Brazil, with hepatosplenomegaly, were divided into 2 groups: (A) 23 in whom schistosomiasis was the sole or by far the preponderating cause of portal hypertension ; and (B) 47 in whom other factors, *e.g.* undernutrition, alcoholism, and malaria, were more important than the helminth. Adolescents and young adults formed three-quarters of the total, and special emphasis is laid on this, in comparison with the usual age incidence of the

cirrhoses. The 2 groups were compared as regards special signs and symptoms, and the results of certain biochemical tests.

Mention is made that protein deficiency, especially deficiency of proteins of high biological value, affected patients in group B particularly.

The characteristic form of the disease was moderate or considerable splenomegaly (almost always irreversible) with liver enlargement varying from slight to great; in one-third of the patients the left lobe was especially affected, possibly because of its blood supply from the inferior mesenteric vein, the tributaries of which are the principal sites of infestation by the worm and its ova. Three-quarters showed splenomegaly of grade III or IV and four-fifths liver enlargement, but no relation existed between the size of these two organs and the intensity of the clinical symptoms, the most prominent of which were the haemorrhages from the digestive tract; ascites was not found in group A. Hepatic coma occurred in 3 patients and 9 others died from causes linked with the medical or surgical treatment of the syndrome.

In 64 patients flocculation tests of so-called liver function showed no difference between the two groups; hypoalbuminaemia was found in about three-quarters of the 38 patients studied, while paper electrophoresis of the serum proteins in 13 patients (apparently all in group A) showed 10 with increased gamma globulin. Bromsulphthalein was retained in one-third and the prothrombin time prolonged also in one-third of the number tested [no figures are given].

The author comments on the following points: (1) the notable incidence in young persons; (2) that by itself schistosomiasis can cause a special hepato-splenic syndrome, the basis of which is a fibrosis (Symmers's clay-pipe stem or periportal fibrosis); (3) in inhabitants of rural areas, ankylostomiasis or amoebiasis can anticipate, modify or aggravate the condition, and protein and iron deficiency seem to be of special importance; (4) in group A, clinical signs of functional alteration of the liver parenchyma were practically nil.

[No evidence is given that the patients had a schistosomal infection; percentages are quoted freely, though the number of patients in group A presumably with "pure" *S. mansoni* infection (which was regarded as the standard), is only 23. Hence one anomalous result must greatly affect any percentage quoted. Finally bromsulphthalein and prothrombin time tests are mentioned, but the abstracter has not been able to find any actual figures.] *W. K. Dunscombe*

Villegas-Cinco, Aurora, Guevara, Rosa & Barcelon-Guevara, Aniceta. **Schistosomiasis: a Fourteen-Year Survey of Cases admitted to the U.S.T. Charity Hospital.** *J. Philippine Med. Ass.* 1961, Mar., v. 37, No. 3, 139–51, 1 fig. [21 refs.]

In the 14 years between 1946 and 1959, 127 patients with *Schistosoma japonicum* infection were admitted to a hospital in the Philippines; most of them derived from Leyte and Samar. The preponderance was in patients in the 10–30 age-group, and 56·7% were females. The relevant clinical and other data are set out in a series of tables, with some elaboration of individual case histories in the text. Fuadin was the drug used for treatment and the results, based on an admittedly inadequate period of observation, clearly were indifferent. *A. R. D. Adams*

CHIKAMI, A. [**Studies on *Trichobilharzia ocellata* Lavalette, 1855 in Japan**] *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 106–18, 12 figs. [20 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"It has been made clear by works of Tanabe (1953), Oda (1958), and Tanaka (1960) that avian schistosomes bearing a strong resemblance morphologically to *Trichobilharzia ocellata* usually prevailing in America and Europe occur in our country, Japan. The lack of information concerning the identification of these schistosomes is regrettable since these organisms constitute an important hitherto unsolved medical problem. In the present study a further effort was made to taxonomically investigate these schistosomes found in ducks of Japan.

"Results obtained were summarized as follows:

"1) A sort of schistosome was found in ducks, *Anas poecilorhyncha zonorhyncha* Swinhoe and *A. platyrhyncha platyrhyncha* Linnaeus and was identified with *Trichobilharzia ocellata* on the basis of morphological characters of its adults, eggs, miracidia, and cercariae obtained from experimental infection with miracidia. An avian schistosome and its eggs described by Oda (1958) and Cercaria B described by Tanaka (1960) were also identified with those of *T. ocellata*.

"2) *Anas poecilorhyncha zonorhyncha* Swinhoe, *A. platyrhyncha platyrhyncha* Linnaeus, *Hyroca fuligula* Linnaeus, and *Mareca penelope* Linnaeus caught in Oki islands, Aomori Pref., Mie Pref., and Fukui Pref., were proved to serve as the final host of *T. ocellata* by the presence of its eggs in their intestinal mucosa.

"3) In the miracidia of this species ciliated epidermis cells totalling 22 were arranged in four tiers, each of which consisted of 5, 7, 6, and 4 cells from anterior end backward respectively. Germ cells of 18 to 20 could be divided into the anterior and the posterior groups. These are characteristic of this species.

"4) A fresh water snail, *Lymnaea japonica*, was proved to serve as an intermediate host of *T. ocellata*.

"5) The cercariae obtained from the experimental infection of *L. japonica* with miracidia from eggs removed from the intestinal mucosa of the duck in Oki Islands, was identified with that of *T. ocellata* (*Cercaria elvae*) and was experimentally proved to be a causative agent for dermatitis in Oki Islands."

YOSHIDA, Y., NAKANISHI, Y., SHIMATANI, T., OKAMOTO, K., KIKUCHI, A., SAKURAI, T. & ASANO, K. [**Studies on Human Paragonimiasis in Northern District of Kyoto Prefecture. I. An Epidemiological Survey of Paragonimiasis in Amino Town and its Neighbouring Area**] *Japanese J. Parasit.* 1961, Apr., v. 10, No. 2, 204–10, 3 figs. [32 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"An endemiologic survey on human paragonimiasis by the ways of intradermal test, sputum and stool examination was carried out during the period of 1958–1960 in northern district of Kyoto Prefecture. The second intermediate hosts, *Eriocheir japonicus* collected from this area, were examined for infection with paragonimus larvae.

"1) Out of 7,029 children (11 primary, 8 middle and 2 high School) in all the area, 226 (3·2%) were positive for the intradermal test. After the examination of sputum and stools of 192 persons who were positive for the test, 14 persons were positive for paragonimus ova.

"2) Out of 7,155 adults in all the area, 530 persons (7·4%) showed positive for the test. After the examination of sputum and stools of 396 persons who were positive for the test, 12 persons were positive for paragonimus ova. It was observed that the distribution of these 26 persons who were positive for the ova, was localized along the banks of the Fukuda river as shown in Fig. 1 and Fig. 2.

"3) The crab hosts (*Eriocheir japonicus*) were collected from the Fukuda river and the Takeno river and examined for paragonimus larvae. Metacercariae of *P. westermanii* were found in 10 out of 58 crabs (17·8%) collected from the Fukuda river."

YOKOGAWA, M., YUDA, K., SUZUKI, N., KOMIYA, Y., SEKI, T., OTSURU, M. & TSUJI, M. **[Paragonimiasis in Miyagi Prefecture]** *Japanese J. Parasit.* 1961, Apr., v. 10, No. 2, 178–83, 2 maps. [16 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Epidemiological surveys on human paragonimiasis have been undertaken to determine its endemic status in Miyagi Prefecture, 1959 and 1960. The results obtained were as follows:

"1) In a village of Izumi-machi 25 (9·1%) out of 276 inhabitants, in Furukawa-city 6 (1·8%) out of 327, in Kakuda-city 24 (3·1%) out of 784 and in Watari-machi 5 (2·1%) out of 234 gave positive dermal reactions to VBS antigen (Veronal buffered saline extract of the adults of *P. westermani* which were treated by ether).

"And stool examinations were performed on all individuals who gave a positive reaction to VBS antigen. But no paragonimus eggs were found in the feces of all reactors.

"2) Of the 4 villages surveyed, in Izumi-machi situated along the River Nanakitada *Eriocheir japonicus*, the second intermediate host of *Paragonimus westermani*, were abundant and the crabs from this river harboured its metacercariae in 6 (6·7%) out of 90 specimens examined.

"3) On the other hand, two patients with paragonimiasis were recently found in this area, and among most inhabitants in this area were accustomed to eat the crabs.

"4) Accordingly, the authors have concluded that paragonimiasis is endemic among the basin inhabitants of the River Nanakitada."

MIYAZATO, T., ANDO, S. & NAKAGAWA, O. **[One Case of Dermal Heterotopic *Paragonimus* Parasitism which induced Creeping Disease-Like Symptoms]** *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 52–5, 3 figs. [11 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"A patient, an 11-year-old boy, complained of dermal edematous swelling of the right hypogastrial region which showed creeping disease like dermal swelling.

"*Paragonimus westermanii* parasitism and eosinophile leucocyte infiltration in the dermis and subcutaneous tissue were recognized by means of probe laparotomy, furthermore, eosinophile leucocyte infiltration in the liver parenchyma also."

WIRTH, W. A. & FARROW, C. C. **Human Sparganosis. Case Report and Review of the Subject.** *J. Amer. Med. Ass.* 1961, July 8, v. 177, No. 1, 6–9, 3 figs.

See this *Bulletin*, 1952, v. 49, 1059.

DEL TRONO, L. L'imenolepiasi nella zona di Fondi (Latina). [*Hymenolepis* **Infection in the Fondi Zone, Latina Province, Italy**] *Riv. Italiana d'Igiene.* 1961, Jan.–Apr., v. 21, Nos. 1/2, 116–22. English summary (4 lines).

The incidence was 10·25%.

DEL TRONO, L. L'imenolepiasi e la sua bonifica di massa. [*Hymenolepis nana* **and its Mass Treatment**] *Giorn. di Malattie Infettive e Parassit.* 1961, Feb., v. 13, No. 2, 126–8.

In a survey of children for intestinal parasites the author found eggs of *Hymenolepis nana* in the faeces of 187 subjects, which was over 10% of those examined: the ages ranged from 4 to 16 years. For treatment, Acranil was given to 88 children and it cured 86; 13 out of 16 were cured with a preparation containing male fern, 16 out of 30 with atebrin [mepacrine], 9 out of 25 with oil of chenopodium. The other children in the series were given various other preparations, with modest results. The dosage of Acranil is tabulated: it varied from "0·10" [presumably gm.] 2 to 3 times daily according to age, for 4 days, except that on the first day up to 0·5 was given. The author concludes that Acranil is the anthelmintic of choice in the mass treatment of *Hymenolepis nana* infection. *J. Cauchi*

HEYNEMAN, D. **A Natural Population of Anomalous Branched Tapeworms, *Hymenolepis nana* (Cestoda: Hymenolepididae), in a Colony of DBA/1 Mice.** [Correspondence.] *Nature.* 1961, July 15, v. 191, 297–8, 1 fig.

DESCHIENS, R. Considérations épidémiologiques et sanitaires sur l'hydatidose humaine dans le bassin méditerranéen et en Corse. [**Epidemiological and Sanitary Observations on Hydatid Disease in the Mediterranean Basin and in Corsica**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 971–90. [18 refs.]

Hydatid disease in man is an important health problem throughout the Mediterranean basin. It is relatively common in the South of France, particularly in the province of Roussillon, and in Corsica.

The overall incidence in countries bordering on the Mediterranean varies

from 7·3 to 17·5 per 100,000, but in purely rural areas the corresponding figure may be as high as 130.

Among animals slaughtered for human consumption (cattle, sheep, goats and pigs) the infection rate is from 22 to 61%. In the dog the adult worm is found in 4 to 26% of those examined.

Preventive measures recommended include (1) seizure and destruction of parasitized organs, (2) destruction or deep burial of parasitized animal carcasses, (3) registration of dogs and their routine disinfestation every 3 to 6 months by arecoline hydrobromide [derived from areca nut], and (4) education of the public in the principles of domestic sanitation. *G. Covell*

Bellodi, L. F. M. La hidatidosis humana en el oeste de Córdoba, Departamentos San Alberto y Pocho. Epidemiología–Clínica–Profilaxis. [**Hydatid Disease in Man in the West of the Córdoba Province of Argentina**] *Semana Méd.* 1961, May 1, v. 118, No. 23, 926–33, 2 maps.

Hydatid infection is high in the west of Córdoba Province, Argentina, and especially in San Alberto and Pocho, where the incidences are respectively 8·35 and 5·04 per 1,000, compared with less than 1 per 1,000 in most of the other 23 departments of the Province. The area is essentially stock-raising and domestic dogs are common. This paper gives detailed epidemiological and clinical data, much of the information being tabulated, based on 113 cases, of which 80 were of the pulmonary form. Control measures are discussed.

H. J. O'D. Burke-Gaffney

Rakower, J. & Beller, A. **Cerebral and Pulmonary Emboli from a Ruptured Hydatid Cyst of the Liver.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 208–14, 15 figs. on 4 pls.

" A case is presented of an undiagnosed *Echinococcus* cyst of the liver, which ruptured into the abdominal cavity and into the veins of the inferior caval system. Lesions found at autopsy included peritoneal dissemination of *Echinococcus* with multiple secondary cysts and tubercles (hydatid pseudotuberculous peritonitis); thrombosis in a few small pulmonary arteries, due to the hydatid cuticle; and large areas of brain infarction due to multiple emboli of small cysts and cuticular debris.

" The cerebral embolism originating from a hydatid cyst of the liver is believed to be the first reported instance of this condition."

Sawada, T., Kono, M., Sato, S. & Oikawa, S. [**Intradermal Tests in Ankylostomiasis. II. Results of Field Works using S-70 Antigen**] *Japanese J. Parasit.* 1961, Apr., v. 10, No. 2, 171–7. [10 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

" Intradermal tests were conducted in individuals with or without ancylostomiasis. The antigens (S-70) used for intradermal tests were prepared from extracts of adult worms of *Ancylostoma caninum*.

" Results were as follows:

"1) Of 244 individuals suffering from ancylostomiasis positive reactions were found in 215 cases (88·1 per cent.), doubtful in 11 cases (4·5 per cent.) and negative in 18 cases (7·4 per cent.).

"2) Of 193 individuals, who were negative in stool examinations for hookworm by flotation method, positive skin reactions were found in 67 cases (34·7 per cent.), doubtful in 15 cases (7·8 per cent.) and negative in 111 cases (57·5 per cent.).

"3) The antigenic potency decreased remarkably by heating at 80°C. for 40 minutes.

"4) The antigens for intradermal tests were dissolved in saline without merthiolate, but when they were dissolved in saline with merthiolate (1 : 10,000), they showed often false positive reactions and moreover its antigenicity was reduced by the addition of merthiolate.

"5) Intradermal tests showed the same intensity in patients during about one month after therapy.

"6) By intradermal injection of 0·05 ml. of saline as antigen control, positive reactions were also found in 37 cases (7·8 per cent.) of 437 cases."

See also this *Bulletin*, 1955, v. 52, 387.

ISIZAKI, T., KUTSUMI, H., KUMADA, M., KOMIYA, Y., ARAKI, H., TAKAYAMA, H., OKADA, K. & NOZAKI, S. **[Clinical Studies on Hookworm Carriers. 7. Allergic Aspect of the Symptoms produced by Hookworm Infection]** *Japanese J. Parasit.* 1961, Apr., v. 10, No. 2, 211–20, 8 figs. [26 refs.] [In Japanese.] English summary.

ELOY, R. Le traitement de l'ankylostomiase par l'hydroxynaphtoate de bephenium chez l'enfant. **[Treatment of Hookworm Disease in Children with Bephenium Hydroxynaphthoate]** *Ann. Soc. Belge de Méd. Trop.* 1961, Feb. 28, v. 41, No. 1, 29–33.

The English summary appended to the paper is as follows:—

"The author has successfully treated 42 children by bephenium hydroxynaphthoate. He emphasizes the perfect tolerance of the product which enables the little patient to be treated a few days after admission to potentiate the effects of iron and of the various stimulants, and so to reduce the length of stay in hospital."

KOMIYA, Y., KOBAYASHI, A. & SUGIYAMA, T. **[Trial for reducing the Toxicity of 4-Iodo-Thymol by the Use of Glucuronic Acid Preparation]** *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 14–18. [12 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Glucuronic acid is now being applied to the detoxication of some chemicals, because of its characteristic activities for detoxication and/or promoting the liver function of the patients.

"If glucuronic acid should be proved to be effective on reducing toxicity of anthelmintics, this compound would be usefully available in mass-treatment along with the anthelmintics.

" Present study was chiefly designed to know whether glucuronic acid would effect a reduction in the toxicity of 4-iodo-thymol, an anthelmintic for ancylostomiasis, when both the compounds were administered to the patients with hookworm.

" Glucuronic acid preparation (Guronsan) was given orally to 100 patients harbouring hookworm at a dose of 6 mg of glucuronic acid lactone per Kg and at the same time 100 mg/Kg of 4-iodo-thymol. Control group consisting of 121 patients was treated with the anthelmintic only.

" The results were no differences in toxicity as well as in cure rate of 4-iodo-thymol between the group treated with Guronsan and that non-treated."

FERRIOLLI, F., Jr. Nova modificação do método de extração de Looss-Baermann para pesquisa de larvas do *Strongyloides stercoralis* nas fezes: técnica do pires. [**A New Modification of Looss-Baermann's Technique for the Extraction of Larvae of *Strongyloides stercoralis* from Stools: the Dish Technique**] *Rev. Inst. Med. Trop.* São Paulo. 1961, Jan.–Feb., v. 3, No. 1, 9–14, 2 figs. [18 refs.]

The English summary appended to the paper is as follows: —

" A new modification of Looss-Baermann's technique for the extraction of larvae of *Strongyloides stercoralis* from stools is described. Stool specimen is placed on a copper-sieve with 1,225 meshes per square centimeter and mounted in a metal ring seven centimeters wide and one centimeter high, having a holder to facilitate manipulation. This sieve is brought into contact with warm water (40–45°C.) contained in a Pyrex dish 9 centimeters in diameter. In order to avoid exposition to air the stool specimen on the sieve is covered with a metal cover having two holes.

" After an hour, the sieve is removed and *Strongyloides* larvae are searched for in the dish with the aid of a stereoscopic microscope. When small fecal particles and soluble substances pass through the screen and produce a turbidity intense enough to obstruct visualization of larvae, the water is transferred to a test tube and centrifugated at 1,500 r.p.m. for two minutes, and the sediment is examined between slide and cover slip.

" This technique is simple, hygienic, and economical, and gives good results. Fifty-three positive specimens examined simultaneously by Looss-Baermann's modified technique as well as by the new one gave substantially the same results, that is, 92·4 per cent. and 94·34 per cent. of positive cases, respectively."

BARLOW, J. B., POCOCK, Wendy A. & TABATZNIK, B. A. **An Epidemic of " Acute Eosinophilic Pneumonia " following " Beer Drinking " and Probably due to Infestation with *Ascaris lumbricoides*.** *South African Med. J.* 1961, May 13, v. 35, No. 19, 390–94, 2 figs. [24 refs.]

A second epidemic of presumed massive *Ascaris* infection after a beer party [see PATZ, this *Bulletin*, 1960, v. 57, 153] is reported from Johannesburg. Everyone who drank the beer was affected—a total of 13 Bantu adults—while one person who was present but did not drink escaped. Symptoms began with an itchy rash, followed on the 5th to 7th day after the party by dyspnoea and a

dry cough, and thereafter were very similar to those in the previous epidemic, though in the present case one patient died and 2 developed congestive heart failure. The highest eosinophil count recorded was 66% of a total leucocyte count of 20,400 per cmm. Increased hilar shadows or widespread mottling were seen in the chest radiographs of all 8 patients so examined. The pathogenic role of *Ascaris* could not be proved, as the sputa were not examined for larvae. Details of the party were obtained only with difficulty, but apparently the beer had been hidden for 3 days near the bank of a stream, and might have been contaminated there. *Alan B. Raper*

HUANG, Wen-Hsien. **Seasonal Fluctuations of *Ascaris* and *Trichuris* Infections among School Children in a City, Taiwan.** *J. Formosan Med. Ass.* 1960, Oct. 28, v. 59, No. 10, 1153–61, 1 fig. [16 refs.]

In the city of Taipei, Taiwan, infection with *Ascaris* is less frequent than in rural areas. The most likely sources of infection are vegetables which have been grown outside the city and fertilized with nightsoil. Sanitary facilities are available and used by all except the youngest children.

A group of 388 children aged 6 to 12 years was selected to determine how quickly infection would occur with *Ascaris lumbricoides* and *Trichuris trichiura* and how quickly reinfection with *Ascaris* would be established after treatment.

Stools were examined monthly by two direct smears, the salt flotation method and, if necessary, by the Stoll dilution egg counting technique; a modified life table technique was employed to utilize the experience of every person under test, even though some were lost sight of before the end of the year.

Observation of 306 children, originally negative, for a year showed peaks of infection with *Ascaris* during the summer (June to August) and winter (November to April). At the end of 12 months 21·3% had become infected; this figure is higher than the figure for the group as a whole at the end of the year and for a random sample of schoolchildren (18·8%) which suggested that some infections were terminated during the year by spontaneous voiding of *Ascaris*.

Of 57 children who had been cleared of *Ascaris* none was reinfected before the eighth month; thereafter the rate of reinfection seemed to be about the same as the rate of the previously determined fresh infection, although the numbers were small.

Similar observations on trichuriasis showed peaks of infection in the winter and summer. By the end of 12 months 17% of the children had become infected. This figure is much lower than in the random sample (31%) and is the same as in the trial group as a whole at the end of the year, suggesting that there is no spontaneous voiding of the worms in this relatively short time.

M. J. Colbourne

KAWAZOE, Y. **[Studies on Physiological Aspects of *Ascaris lumbricoides* at Early Developmental Stages. I. Oxygen Consumption of Eggs at Various Developmental Stages and of Larvae hatched *in vitro*]** *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 26–34, 16 charts. [16 refs.] [In Japanese.] English summary. **[II. Glycogen Contents of Eggs and Larvae in Various Developmental Stages]** *Ibid.*, Apr., No. 2, 145–51, 7 charts. [12 refs.]

Ohzu, S. **[Study on the *Ascaris* Eggs exposed under the Oxygen Free Condition for a Long Time at a Rather High Temperature]** *Japanese J. Parasit.* 1961, Apr., v. 10, No. 2, 221–39, 10 figs. [36 refs.] [In Japanese.] English summary.

Saito, S. & Kawazoe, Y. **[On Oxygen Consumption of *Ascaris lumbricoides* Larvae migrating through the Body of the Host]** *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 35–9, 4 charts. [19 refs.] [In Japanese.] English summary.

Warner, F. S. & Healy, J. D. **Fatal Ascariasis in a Negrito Child.** *J. Amer. Med. Ass.* 1961, June 17, v. 176, No. 11, 949–51, 4 figs.

The authors write from a U.S. Air Force base in the Philippines. Adjacent to the base is a Negrito tribe among whom 95% of the children seen in the hospital at the base were shown to have ascariasis. The present account refers to a Negrito child aged 2 years, with fever, cough, diarrhoea and the vomiting of live *Ascaris* for 6 successive days. The child was anaemic (Hb 8 gm.%) and harsh sounds were heard over both lung bases. X-ray examination showed the lungs to be clear but there were coiled densities over the liver area.

On admission the child was given antibiotics and dithiazanine and soon passed 5 bloody stools each containing several live *Ascaris*. Her condition appeared to be stable but she died suddenly after 13 hours.

The liver weighed 500 gm., twice the normal figure, and many areas were soft. Numerous *Ascaris* were seen beneath the capsule and in cavities seen on section. These cavities communicated with the common bile duct which was distended by some 30 *Ascaris*. It was estimated that about 200 *Ascaris* averaging 8 cm. in length were present in the liver.

3 live worms were found in the oesophagus, 10 in the stomach, 30 in the duodenum, several hundred in the small bowel, and 75 in the colon. The largest worm, 20 cm. in length, was found in the ileum. The pancreatic duct was dilated by a worm, and small abscesses were found in the pancreas. No *Ascaris* were found in the lung.

The authors conclude that a great quantity of ova must have been ingested in a relatively short time and express surprise that migration of so many larvae through the lungs had caused so few symptoms. It is noteworthy that eosinophilia was absent. Anaemia is not found to be a reliable sign of parasitism in these Negrito children, as their haemoglobin concentration is usually below 10 gm.% owing to inadequate diet. Despite the heavy infection of the biliary system no jaundice or hepatic insufficiency was found and there was no intestinal obstruction. The findings are well illustrated in a skiagram and 3 photographs.

Finally the authors observed that in 373 stools from Negrito children examined at their hospital in the year ending June 1960, only 10·7% were positive, which reflects the effects of public health measures and education.

H. J. O'D. Burke-Gaffney

GARCIA, Edito G., CABRERA, B. D., CRUZ, Trinita A. & JUECO, Nonette L. **Reinfection Rates of Successfully Treated Cases of Ascariasis.** *J. Philippine Med. Ass.* 1961, Apr., v. 37, No. 4, 239–43, 1 fig.

Mass treatment programmes to cure ascariasis are being undertaken in the Philippines where the disease is prevalent but where public health measures to stop transmission are only just being implemented or are non-existent; the authors considered that the determination of the reinfection rates in 470 successfully treated cases would give an indication of the real value of such programmes.

Of 780 Manila schoolchildren aged 8 to 14 years, examined in January 1960, 666 were found to be infected with ascariasis. 470 were successfully treated by various treatment schedules [this *Bulletin*, 1961, v. 58, 716]. The criterion of successful treatment was failure to demonstrate ova after the examination of two stool specimens collected on separate dates 5 to 7 days after treatment. From each of the two specimens 4 coverslip preparations were examined for the presence of ova.

It was possible to follow up 373 of those considered to have been cured; after 4½ months 69% were positive and after 8½ months 90%.

The authors consider that only a negligible proportion of these apparent reinfections were caused by the development of larval stages already in the body at the time of original treatment.

It is concluded that in order to be effective mass treatment must be preceded by measures to reduce the chance of reinfection. *M. J. Colbourne*

KOZAI, I. & KOBAYASHI, A. **[Ovicidal Effect of a Sodium Nitrite Preparation, "Derisan" on *Ascaris* Ova in Nightsoil]** *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 56–61. [In Japanese.]

The English summary appended to the paper is as follows:—

"Sodium nitrite was pointed out by the present author (Kozai, 1960) to be the most promising chemical among those ovicides already known for ascaris ova in nightsoil when it was applied to the ova along with calcium super phosphate.

"Recently an ovicidal preparation was newly produced in Japan under the trade name of 'Derisan', which contained sodium nitrite (64%), capric acid (ca. 2%) and other excipients.

"In the present study, experiment was carried out in order to know the ovicidal activity of 'Derisan' under various conditions in the acidified nightsoil medium with calcium super phosphate.

"The artificial nightsoil here applied contained one part of feces and five parts of urine, and showed as high as pH 8·8–9·0 just before use.

"The results obtained were as follows:

"1. When 3 or 4 g of calcium super phosphate was added to the 50 ml of the alkaline nightsoil 'Derisan' produced 100% kill of the ova at dilution rate 1:643 (equivalent to 1:1000 of sodium nitrite contained in 'Derisan') after 3 day exposure at 28°C.

"In the case of using sodium nitrite singly, the 1:1000 concentration of the chemical allowed the production of larval formation at 56% of the ova in the same medium with 3 g of the calcium salt, though all the ova were killed

with the 1:1000 dilution of the chemical when 4 g of the calcium salt was added.

"2. Another test was performed at a lower temperature 5°C using the same nightsoil. By the 3 day exposure to the 1:643 dilution of 'Derisan', 100% of the ova were killed only when at least 5 or more gram of the calcium salt was added. When sodium nitrite was simply applied to the ova, however, it was impossible to achieve complete damage of larval formation of the ova with the 1:1000 dilution of the chemical even in the same medium with 5 g of the calcium salt.

"3. From the above results obtained by the comparing effect of 'Derisan' with that of sodium nitrite, the ovicidal activity of 'Derisan' against ascaris ova was considered to be mainly dependent upon that of sodium nitrite contained in this preparation though some slight efficacy of capric acid which was also contained in the small amount in the preparation was observed."

INDIAN J. MALARIOLOGY. 1960, Dec., v. 14, No. 4, 333–686, illustrated. [Numerous refs.] **Symposium on** *Wuchereria bancrofti* **and** *Brugia malayi*.

In the introduction to the special number of the *Indian Journal of Malariology* on *Wuchereria bancrofti* and *Brugia malayi* the editor writes that "this symposium tries to present a cross section of the recent advances on the various aspects of the subject and problems faced by the research and public health workers in their efforts. It is expected that this will stimulate and materially assist research and control projects".

The symposium contains 28 papers preceded by an introduction in which the editor gives a brief summary of each paper. These papers fall into two categories: reviews of recent work and reports of original work. The reviews, which summarize papers already abstracted in this *Bulletin* will only be mentioned briefly.

R. C. MUIRHEAD-THOMPSON (pp. 409–414) summarizes experimental studies on the infective reservoir of *W. bancrofti* and *B. malayi*, and G. S. NELSON (pp. 585–592) the means of identification of filarial larvae in their vectors.

H. K. BEYE and J. GURIAN (pp. 415–440) review the data related to the perpetuation of the life cycles of the filariae and describe the epidemiological factors involved in the transmission of the disease; they suggest a working model expressing the interrelationship of host, parasite and vector, which should give a reasonable check on the continuing effectiveness of control measures without adding greatly to the measurements usually undertaken.

F. HAWKING (pp. 567–573) reviews problems associated with the periodicity of microfilariae and J. ALLEN SCOTT (pp. 575–583) immunity to infection with *Wuchereria*.

Regional reviews are given by the following authors: P. JORDAN on Africa (pp. 353–362), R. KIRK on the Sudan (pp. 387–390), and A. B. G. LAING on Malaya (pp. 390–408). R. H. WHARTON lists and clarifies the mosquito hosts and parasites of Malayan filariasis (pp. 375–378). J. F. KESSEL reviews progress in Tahiti (pp. 509–519) and also discusses non-periodic *W. bancrofti* filariasis in general. H. K. BEYE (pp. 503–508) details the work of the major International Health Agencies in filariasis control.

The papers that record the results of original work fall into two categories:

those dealing with filariasis in general and those reporting the results of regional surveys and control projects.

In the papers of general interest S. P. RAMAKRISHNAN, M. I. D. SHARMA and R. L. KALRA (pp. 545–566) report the result of laboratory and field studies on the effectiveness of organophosphorus insecticides in the control of *Culex fatigans*. Baytex, Trithion, Methyltrithion, diazinon, malathion and Phosdrin were tested in the laboratory against larvae and pupae of *C. fatigans*. Trithion and Baytex were found to be the most effective. In field trials, Trithion, malathion and Phosdrin were found effective as larvicides in doses of 0·1, 0·3 and 0·6 lb. per acre of water surface but no persistent effect was detected. Baytex was immediately effective at a dose of 0·05 lb. per acre and, at a dose of 0·6 lb., killed larvae up to 15 days after treatment.

Against adult *C. fatigans*, both in the laboratory and in the field, Baytex was the most effective; at a dose of 100 mgm. per square foot a toxic effect was found to last for at least 8 weeks in sprayed villages. *C. fatigans* (females) resistant to DDT and dieldrin showed no increased tolerance to Baytex and diazinon.

G. H. COORAY (pp. 617–632) in a paper with 20 photomicrographs describes the pathological appearances in 48 cases in which filarial worms (46 adults, 2 microfilariae) alive, dead or calcified were present in the tissues. In only 10 cases had filariasis been recognized clinically; of the adult worms, 7 were alive, 34 dead and 5 calcified at the time of fixation of the tissues. He considers the histological appearances characteristic.

E. W. GAULT, C. K. JOB and J. K. G. WEBB (pp. 633–636) report finding nodules consisting of eosinophils and granulomata containing giant and epithelioid cells in biopsy material from the liver, lung and lymph nodes of typical cases of tropical eosinophilia; in the centre of some of these nodules there were fragments of microfilariae. The significance of these findings is discussed.

E. MONTESTRUC, E. COURMES and R. FONTAN (pp. 637–650) discuss the relation of endemic lymphangitis in French Guiana to *W. bancrofti* infection. They come to the conclusion that tropical lymphangitis is not aetiologically a single condition. Two pathological agents, namely *W. bancrofti* and streptococci, either exclusively or in association, can give rise to identical clinical conditions according to the geographical region concerned. In an appendix they indicate outlines of differential diagnosis based on aetiology.

G. GIGLIOLI and H. M. S. G. BEADNELL (pp. 651–658) report that, although the incidence of filariasis in British Guiana has fallen, a new industrial problem has arisen. Workmen's compensation has been paid to 81 claimants who have attributed filarial disease to a vague injury. Employers may have to reject filarial subjects seeking employment, which would cause considerable hardship. A better understanding of the role of trauma in the pathogenesis of filarial disease is required.

In preliminary notes M. A. U. MENON (pp. 659–662) describes a rapid method of preparing dry mounts of filarial larvae, and G. J. BURTON (pp. 593–594) from Kerala reports finding larval stages of *W. bancrofti* and *B. malayi* in bedbugs.

M. H. M. ABDULCADER and R. PADLEY (pp. 521–535) give details of the progress of the Anti-filariasis Campaign in Ceylon but place the main emphasis in their paper on the system of forms and records that they have found useful in a large-scale campaign. They stress the difficulty of persuading apparently healthy people to take a treatment that makes them feel ill.

The remainder of the symposium consists of records of filariasis surveys and results of control programmes.

Lie Kian Joe, Hudojo, Wijono and S. Amaliah (pp. 339–352) carried out a survey in Rawasari district, on the outskirts of Djakarta, in order to study some of the factors influencing transmission. Of 196 persons examined 16·3% were infected with microfilariae (*W. bancrofti,* periodic form), with an average density of 33·6 microfilariae per 20 cmm. per positive patient. Of 17,247 *Culex pipiens fatigans,* the only vector in the district, 3·5% harboured larvae of *W. bancrofti* but only 0·1% infective stage larvae. The relatively low level of transmission is attributed to the short expectation of life of the vector. Of those dissected about 85% were nulliparous and only 1·6% showed more than one follicular relic. Transmission is only possible because of the high density of the vector.

K. Morishita (pp. 363–374), after reviewing previous investigations, reports the results of recent surveys in Central Japan. He considers that, although some new endemic foci have been discovered and there is evidence of continued transmission, the incidence of filariasis, and particularly elephantiasis, has decreased remarkably in recent years. In this part of Japan *W. bancrofti* alone is encountered.

M. Sasa, S. Hayashi and H. Tanaka (pp. 441–456) report the results of two schemes, one to control Malayan filariasis in the island of Hachijo-Koshima south of Tokyo and the other in 20 villages in south-west Japan where *W. bancrofti* infection is a serious health hazard.

Over the past 10 years the filariasis rate in Hachijo-Koshima has fallen from 31·5% (29/92) to 7% (3/43). In 1950 and again in 1958 patients with either elephantiasis or positive for microfilariae were given daily treatment with diethylcarbamazine. Measures against the vector *Aedes togoi* included the use of fish (goldfish or *Orizias latipes*) in rain water tanks, 5% DDT powder in rock pools on the beach and residual house spraying with DDT.

In the pilot control of *W. bancrofti* infection DDT and dieldrin as house sprays seemed to be effective but the results were obscured by the concurrent antilarval measures to remove the breeding places of the vector, *Culex pipiens pallens,* which were restricted to polluted water. Treatment trials with diethylcarbamazine led to several important conclusions. Short-period treatment systems were inferior to the long-interval system (even though the dose used was small) and a combination of the two methods is recommended; if selective treatment is given only to people found positive for microfilariae, new positives will always be detected at subsequent examinations; in areas of low endemicity it is difficult to treat the whole population on account of the expense and difficulty of administration. Details are given of some basic studies of cotton-rat filariasis carried out in order to elucidate some of the problems that arose during the pilot project.

The other papers deal with various aspects of filariasis control in India.

In one of the most important papers of the symposium, S. P. Ramakrishnan, N. G. S. Raghavan, A. K. Krishnaswami, C. P. Nair, P. C. Basu, Dalip Singh and K. S. Krishnan (pp. 457–489) critically appraise the progress of the National Filaria Control Programme in India from 1955 to 1959. The programme, which aims at tackling the problem of *W. bancrofti* infection, is run by the state Governments; the Government of India, with assistance from the United States Technical Cooperation Mission, provides the requisite quantity

of insecticides, drugs, larvicides, spraying equipment and transport. Control of Malayan filariasis has been excluded pending more complete knowledge of the most suitable methods.

The carrying out of the first objective of the programme has revealed that about forty million people are at risk (the results of the surveys are tabulated and mapped in the paper).

Pilot control schemes have been carried out throughout the country to evaluate locally all the methods of control. Mass drug administration with diethylcarbamazine has so far covered a population of 7·5 million; about 56% of the population covered actually received the drug which was given in a dose of 200 mgm. per adult daily for 5 days to all people in the filarious community. It proved difficult to obtain full public cooperation largely because of the unpleasant side reactions.

House spraying with dieldrin has been found ineffective and has been abandoned. Trials with BHC are in progress. Larval control operations which have so far been limited to urban areas are to be extended, as an experiment, to some rural areas.

Epidemiological assessment has been based on microfilaria rates, disease rates and average microfilarial infection. In most areas there has been a satisfactory fall. In a few there has been a rise which is under investigation.

The difficulties which have arisen in the early years of this gigantic campaign, including staffing difficulties, are critically analysed and indications are given of future trends in the programme.

The details of the distribution of filariasis in Uttar Pradesh are amplified by M. V. Singh in another paper (pp. 379–386). E. P. Gonsalves (pp. 495–501) gives details of the results of therapy with diethylcarbamazine in Mangalore town; a fall in the infection rate immediately after treatment was followed by a gradual rise in subsequent years.

Two papers report the results of investigations on the bionomics of important vectors of filariasis: Rajindar Pal, C. P. Nair, S. Ramalingam, P. V. Patil and Baboo Ram (pp. 595–604) report on *C. fatigans*, *M. annulifera* and *M. uniformis* in Ernakulam (Kerala), and B. L. Wattal and N. L. Kalra (pp. 605–616) on *C. fatigans* near Ghazibad (Uttar Pradesh). Both papers pay particular attention to the resting habits of these species.

C. Joseph, M. A. U. Menon and G. K. Nair (pp. 663–686) report the results of trials to control Malayan filariasis in 1958 and 1959 in Kerala. Five villages were treated as follows: the first indoor dieldrin spraying, the second dieldrin and mass therapy, the third *Pistia* clearance, the fourth *Pistia* clearance and mass therapy; the fifth was left as a control. The vectors were reduced to a low density in all the test villages, the microfilaria rates fell only in the villages where mass treatment (intensive therapy for 5 days) was carried out. The authors note that although dieldrin spraying produced the best result it was accompanied by the appearance of very large numbers of *C. fatigans*; they fear this may lead to the spread of *W. bancrofti* infection which is already endemic in Kerala. As they did not find it feasible to include more than 60% of the population in their mass therapy programme, they consider that *Pistia* control combined with mass therapy gave the best results.

The symposium contains a wealth of thought-provoking information; one point stands out, programmes utilizing long-term intermittent treatment have been more successful than those using the short-term intensive courses.

The editor concludes: "Filariasis remains a challenge to many parts of the tropical world. . . . It is hoped that this symposium will stimulate further research and readjustments in our approach to the problem." His hopes should be fulfilled. *M. J. Colbourne*

SINHA, A. P. **Filaria Survey in Basti (Uttar Pradesh).** *Indian J. Pub. Health.* 1960, July, v. 4, No. 3, 146–51.

Basti district, which lies in the northern part of the State of Uttar Pradesh, has an area of 2,822 square miles and population of 2,388,000. Basti town with a population of 42,513 can be said to be a "city of length without breadth"; it is 4 miles long and one mile broad.

91% of the population of the district is engaged in agriculture, 82% are Hindu and more than 99·9% speak Hindustani. The water supply of the town is principally from wells, although a piped water supply is being introduced. There is no proper drainage system; large areas of the town are frequently water-logged.

A filariasis survey was carried out in September, October and November (? 1959) "in the special Study Area (*i.e.* the Basti town) and the Check Area". About 20 cmm. of blood were collected between 7.30 and 11.30 p.m. from 4,720 persons in the special study area and from 4,702 in the check area. More than 15% of the population were surveyed in each area; all parts of the areas, all the age-groups, both sexes and all the socio-economic groups were represented in the samples.

The microfilaria (*Wuchereria bancrofti*) rate was 9·6% in the special study area and 9·9% in the check area. The average density was 24 microfilariae per 20 cmm. in the study area and 20 in the check area.

The filarial disease rate was 14·8% in the study area and 9·9% in the check area, the highest infection rates being in subjects over 20 years old. There were 736 cases of hydrocele and other genital lesions, 67 of filarial fever, 252 of swelling of the leg and 105 of the arm.

The endemicity rates were 23·1% in the study area and 18·9% in the check area [in the author's summary these rates are recorded as 27% and 16·3%; other figures in the summary do not agree with those in the text of the report].

Collections of adult mosquitoes were made between 6.30 and 8.30 hours in 30 catching stations, 10 of human dwelling type, 10 of cattle shed type and 10 of mixed type. 10 minutes were spent in each catching station. 4471 mosquitoes were collected of which 2,931 were culicine; of 822 mosquitoes dissected only *C. fatigans* was found infected (10% in the special study area and 9·2% in the check area).

[It appears that this paper gives the detailed results for Basti of a survey of filariasis all over India, the results of which have been summarized in the symposium on filariasis in the *Indian Journal of Malariology*, see above, p. 1157.]

M. J. Colbourne

SHIMONO, O. [**Studies on *Wuchereria bancrofti* Infection in Ehime Prefecture. I. Epidemiology**] *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 119–25, 1 map. [10 refs.] [In Japanese.]

The English summary appended to the paper is as follows: —

"1. Extensive surveys of clinical filariasis and microfilarial carriers were made in Ehime Prefecture, northwest of Shikoku Island. Although our information on the distribution of filariasis based on previous reports has been restricted to west coasts, results of the present survey as accumulated by the medical association elucidated that such clinical cases as chyluria, elephantiasis or hydrocele are distributed almost all over the prefecture. Chyluria was found to be the predominant clinical manifestation of the bancroftian filariasis in this region.

"2. Surveys of microfilarial carriers among the inhabitants of Misaki Peninsula have been made with the three-drop blood examination method. 159 positive cases were detected out of 9,963 individuals examined, with the positive rate of 1·60%. Remarkable differences in the positive rates were seen among the villages concerned, from the highest of 5·52% to the lowest of 0·11%. The positive rates increased as the age got older, with the highest peak at the age-group of 40 to 60 years' old."

NAGATOMO, I. **Epidemiology and Control of Bancroftian Filariasis in some Villages of Nagasaki Prefecture. 1. Incidence of Filariasis and Natural Infection Rate of Mosquitoes in Nanatugama and Taira Villages.** *Endemic Dis. Bull. Nagasaki Univ.* 1960, Dec. 23, v. 2, No. 4, 296–306, 1 fig. [19 refs.] **2. Nocturnal Feeding Activities of Mosquitoes in a Filaria Endemic Section, Kamisikama of Nanatugama Village.** *Ibid.*, 307–20, 6 figs. [17 refs.] **3. Epidemiology and Mass Treatment of Filariasis in Amakubo Village.** *Ibid.*, 1961, Mar. 23, v. 3, No. 1, 75–85, 2 figs. [15 refs.]

1. The author reports the results of blood surveys carried out in August 1954 in villages in Nagasaki prefecture; the filariasis (*Wuchereria bancrofti*) rate varied from 6 to 9%.

2. Mosquito surveys carried out in August 1955 in one section of one of the villages showed that *Culex pipiens pallens* was by far the most important vector.

3. A control experiment with diethylcarbamazine was carried out in one village, with a population of about 630, from October 1953 to February 1955. All patients with positive blood films were treated with repeated 10-day courses (2 mgm. per kgm. body weight 3 times a day) until they were negative; there were intervals of about 2 months between courses.

Three surveys were carried out, in October 1953, March 1954 and July 1954. There were 92 people positive at the first survey, 11 new people positive at the second and 6 at the third. Of these 109 positive subjects, 10 complained of past or present symptoms (6 histories of fever). 45 were cleared by one course, 46 by two, 7 by three, 1 by four and 1 by five courses. The remainder died or left the village. 79 complained of reactions to the treatment lasting about 2 days and usually starting on the second day of the first course. *M. J. Colbourne*

RAGHAVAN, N. G. S. **The Vectors of Human Infections by *Wuchereria* Species in Endemic Areas and their Biology.** *Bull. World Health. Organization.* Geneva. 1961, v. 24, No. 2, 177–95. [Numerous refs.]

This is a useful summary of the mosquito vectors of human filariasis due to *Wuchereria bancrofti* and *Brugia malayi* throughout the tropics, and is an extension of an earlier summary limited to India and the Far East [this *Bulletin*, 1954, v. 51, 1080]. The biology of the principal vectors is briefly discussed, and suggestions made for further research. The principal records of natural and experimental infections in mosquitoes are then summarized in 6 tables which contain a great deal of information.

[There are a few errors, *e.g.* in table 6 *A. letifer* and *A. maculatus* in Malaya should appear under *W. bancrofti*, not under *B. malayi* (see *Annual Report Inst. Med. Res. Malaya for the Year 1950*, p. 34), and a few omissions, *e.g.* BRUG'S paper on the vectors of *B. malayi* in Celebes [this *Bulletin*, 1937, v. 34, 890], but, as the reviewer knows from personal experience, the published records are so scattered and of such variable quality that some errors or omissions are almost inevitable. It is to be hoped that revised editions of this summary will be published from time to time.] *J. A. Reid*

KOYAMA, F. [**Basic Studies on Immunization against Filariae. 2. Phenomenon of Arthus caused by Adult-Worm and Microfilarial Antigens**] *Japanese J. Parasit.* 1961, Apr., v. 10, No. 2, 249–57, 13 figs. [15 refs.] [In Japanese.] English summary.

BÉNEX, Jacqueline & DESCHIENS, R. Aspects électrophorétiques des protéines du sérum sanguin dans les filarioses à *Wuchereria bancrofti*. [**Changes in the Serum Electrophoretic Patterns in Infections with** *Wuchereria bancrofti*] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 932–5, 5 figs. on 2 pls.

The authors have continued their studies of serum proteins in parasitic infections by the electrophoretic strip method. They had previously analysed the patterns in infections with *Fasciola hepatica* and *Schistosoma mansoni* and *S. haematobium* [this *Bulletin*, 1961, v. 58, 921], and have now done the same in infections with *Wuchereria bancrofti*.

They found the same type of change, that is increase in gamma globulin and alpha 2 globulin and a decrease in albumin. This change was less marked than in schistosomal infections, but more marked than in distomiasis. They noted particularly that these changes were less marked in old inactive infections than in active infections with microfilariae present in the blood. They found that there was a close correlation between the titre of filarial complement-fixation test and the percentage of gamma globulin. On the other hand they did not find any relation between the degree of eosinophilia and the serum protein pattern.

They give a table of the mean serum protein percentages in the three infections in comparison with the normal:

	Albumin	Alpha 2 globulin	Gamma globulin
Filarial sera ...	48%	11·8%	22·8%
Schistosomal sera	42%	18·5%	26%
Normal sera ...	58·4%	7·5%	16%

A. C. E. Cole

BURNETT, G. F. & MATAIKA, J. U. **Mass-Administration of Diethylcarbamazine Citrate in Preventing Transmission of Aperiodic Human Filariasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, Mar., v. 55, No. 2, 178–87, 1 map.

This trial of mass treatment with diethylcarbamazine was carried out in 15 villages in Fiji where infection with *Wuchereria bancrofti* var. *pacifica* was endemic, and four actual or potential vectors were present. Blood surveys were made by the examination of 3 thick drops of 20 cmm. each, from which microfilarial infection rates and mean microfilarial density per 20 cmm. were calculated. Mosquitoes were caught by various standard methods, and examined for filarial larvae. These blood and mosquito surveys were made before and after the first mass treatment; a second mass treatment was given about 6 months after the first, and the blood and mosquito surveys were then repeated.

Each course of treatment for an adult consisted of 400 mgm. diethylcarbamazine citrate once a week for 6 doses, with reduced doses for children, representing a weekly dose of almost 6 mgm. diethylcarbamazine citrate per kgm. body weight. Drug administration was supervised by one of the authors or by an Assistant Medical Officer. The results are given in the text and in tables.

There was a considerable amount of population movement, which made interpretation of the results more difficult. At the first survey the microfilaria rate was 12·2% (146 out of 1,200) and the mean microfilaria count per 20 cmm. blood for all films was 4·048; at the final survey these figures were 2·7 % (30 out of 1,123) and 0·360. The 30 microfilaria carriers at the final survey included 15 untreated newcomers. When everyone receiving less than one full course of treatment is omitted, the microfilaria rate at the third survey is shown to be 1·56% (15 out of 962).

The effect of the second course of treatment was studied. Out of 82 microfilaria carriers, 32 were still positive after the first treatment, but only 5 remained positive after the second treatment. The corresponding mean microfilaria densities were 36·2, 0·47 and 0·07 [not 0·7 as printed in Table III].

The modified Knott technique was also used to examine the blood from a small number of treated microfilaria carriers. Out of 31 patients whose films (3 of 20 cmm.) did not show microfilariae, 13 were found to have microfilariae in 1 cc. venous blood. The effect of mass treatment on the filarial larva rate in mosquitoes was also studied. Before treatment started, 0·66% (8 out of 1,208) *A. pseudoscutellaris* and *A. polynesiensis* contained mature larvae of *W. bancrofti*; after the first mass treatment this rate was reduced to 0·12% (1 out of 841) and no mature larvae were found in 831 mosquitoes dissected after the second mass treatment. This reduction suggests that the human population is the only source of *W. bancrofti* in this particular area; *C. fatigans* is not regarded as an important vector here, and only a few *A. fijiensis* were dissected. Infections with *Dirofilaria immitis* continued to be found in mosquitoes, but could be readily identified from *W. bancrofti*.

The authors remark that the true value of medication lies in the permanence of its effects and that this can be assessed only by another blood survey in a few years' time. Meanwhile the results recorded suggest that transmission of filariasis in this area may have ceased.

[In any investigation involving repeated surveys, population movement is

always a handicap to the interpretation of results, and may of itself increase or decrease observed infection rates. This difficulty could be overcome if authors would publish at least one set of figures dealing only with the same persons examined at each survey.] *T. Wilson*

LAING, A. B. G., EDESON, J. F. B. & WHARTON, R. H. **Studies on Filariasis in Malaya: Further Experiments on the Transmission of *Brugia malayi* and *Wuchereria bancrofti*.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 86–92.

"1. Successful transmission of semi-periodic *Brugia malayi*, by subcutaneous inoculation of infective larvae, to golden hamsters, dogs and white rats is a further indication of the adaptability of the parasite. With repeated passage, a strain of semi-periodic *B. malayi* might be developed that could be maintained in hamsters or white rats.

"2. Semi-periodic *B. malayi* in a cat infected from man was transmitted to a leaf-monkey (*Presbytis obscurus*) which was already naturally infected with *B. pahangi*. The prepatent period of the transmitted infection was 83 days, and the microfilariae exhibited a marked nocturnal periodicity in the leaf-monkey but otherwise showed features characteristic of semi-periodic *B. malayi*.

"3. Transmission of periodic *B. malayi* to cats was characterized by long prepatent periods (95–175 days), light or scanty microfilaraemia, and calcified worms at post-mortem. Observations on a rhesus (*Macaca mulatta*) and a leaf-monkey (*P. obscurus*) indicated that they were relatively good hosts. After transmission, a marked nocturnal periodicity of microfilariae was maintained in both cats and monkeys. Attempted transmission to a slow loris (*Nycticebus coucang*) was unsuccessful.

"4. Transmission of the periodic form of *B. malayi* to white rats and hamsters was unsuccessful, though there was evidence of some larval development in hamsters. Transmission of both forms to white mice was unsuccessful.

"5. Transmission of periodic *Wuchereria bancrofti* to cats and monkeys was unsuccessful."

[See also this *Bulletin*, 1960, v. 57, 929; 1961, v. 58, 349.]

DISSANAIKE, A. S. & PARAMANANTHAN, D. C. ***Brugia*-Type Adults and Microfilariae in a Ceylon Hare.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 299.

In this short note the authors, from the Department of Parasitology, University of Ceylon, Colombo, note that sheathed microfilariae with characteristic tail nuclei have been reported from several hosts. Among the rodents, a ground squirrel was found infected by LAING *et al.* [this *Bulletin*, 1960, v. 57, 1087]. BUCKLEY [*ibid.*, 1960, v. 57, 832] has shown that adults of at least three of these filarial worms are recognizable as distinct species and has placed them in the new genus *Brugia*.

The present authors have found a microfilaria of the *Brugia* type in the blood of a hare (*Lepus nigricollis sinhala*) shot in a jungle in northern Ceylon and have recovered several specimens of the adult worm from the heart and

hepatic blood vessels. The adult worms differ from hitherto described species of *Brugia* in some features and are much larger. Details will be published elsewhere.

This appears to be the first record of *Brugia* from a hare and it is of interest to note that the adult worms were not found in the lymphatic system. No microfilariae of the *Brugia* type have been recovered hitherto from any host other than man in Ceylon.

[In the original paper, the two references quoted have been transposed.]

H. J. O'D. Burke-Gaffney

BROWNE, S. G. **The Localization of Onchocercomata.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 258–62, 1 fig. [32 refs.]

Onchocercal larvae show an uncanny predilection for certain anatomical sites.

A total of 5,989 persons in a focus in the former Belgian Congo [this *Bulletin*, 1960, v. 57, 622] were found to harbour palpable onchocercomata, a figure representing 13·3% of the total population and 77% of those suffering from onchocerciasis, the remaining 23% having been diagnosed from iliac crest skin snips. Each person had an average of 1·57 sites affected, and 1·61 tumours at each site, or 2·52 tumours per person.

A table is given of the localization of onchocercomata in the focus investigated. The great majority, 72·1%, were situated over the great trochanters, a lesser number on the knees, lumbar vertebrae and ribs. No onchocercomata were detected in inguinal or crural glands. Multiple gland puncture with a wide-bore needle in 54 persons revealed only mature onchocercal microfilariae in 7, implying that fertilized females were not present in the glandular mass.

Over 99·5% of tumours were situated over bony prominences. Trochanteric onchocercomata were found inferiorly and posteriorly to the point of maximum prominence. All tumours in relation to vertebrae occurred in the midline, and most of those in the lumbar and thoracic regions were related to a spinous process. A right-sided preponderance occurred on the thoracic cage of 308 to 200, a preponderance especially noticeable between the fourth and tenth ribs.

Since *Simulium* bite either leg indiscriminately, the right-sided preponderance implies that the migrating filariae must sometimes by-pass the partial barriers near bony prominences on the left side of the body to find their eventual site somewhere on the trunk, and possibly may be explained by sleeping habits and by pressure of hard chairs.

Simulium neavei, the vector, was observed to alight on the skin of the leg, especially the posterior aspect of the calf or the lateral hollows near the Tendo Achillis.

It became apparent that the inoculated larval filariae usually travel in a centripetal direction, influenced by the factors determining the centripetal flow of tissue fluid.

Tumours are situated commonly in the vicinity of scars. During the 12 months elapsing since the surgical removal of hundreds of onchocercomata, 22 new tumours appeared at operation sites, attached to scars, mostly in the trochanteric and sacro-coccygeal regions. It would appear that filariae newly arrived at these sites were arrested there by the scar tissue barrier.

All the sites have certain features in common: the layer of subcutaneous fat is reduced in thickness, and the bundles of dermal fibro-connective tissue converge there in more or less well-defined planes. *Philip Manson-Bahr*

KIKUOKA, H., MASAOKA, T. & NISHIMURA, T. [**An Outbreak of Gnathostomiasis which is found Early through Routine Blood Test**] *Japanese J. Parasit.* 1961, Feb., v. 10, No. 1, 40–44. [21 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Five cases of Gnathostomiasis among 7 persons, who have eaten an Ophicephalus, are found by eosinophilia (up to 80%) and leucocytosis early before creeping eruption occurs.

"After examining the ponds in the neighbourhood, a heavy infection of Gnathostomiasis was found in the Ophicephali of Gotoku pond in Nara city. A fresh case of human Gnathostomiasis due to Ophicephalus of the pond was found and reported."

SUZUKI, R., YAMAUCHI, K. & KOBAYASHI, A. [**Mass Treatment of Enterobiasis with Pyrvinium Pamoate (Poquil)**] *Japanese J. Parasit.* 1961, Apr., v. 10, No. 2, 298–301. [In Japanese.]

The English summary appended to the paper is as follows:—

"Results of mass-treatment of enterobiasis employing two different forms of Pyrvinium pamoate preparation, capsule and syrup, are described.

"A total of 173 school children positive for pinworm ova were treated with the compound in a single dose of 5 mg. per body weight. Three negative swabs 2 weeks after the treatment were chosen as the criterion of cure, and the results obtained were as follows:—

"The cure rates obtained with the respective forms of the drug were 99·2% (127 of 128) with the capsule and 91·1% (41 of 45) with the syrup form.

"Difference in toxicity, however, seems to indicate the superiority of the capsule over the syrup form though both as equally efficacious in therapeutic value.

"The excellent value of Pyrvinium pamoate (Poquil) as an anthelmintic drug for pinworms was discussed."

[See this *Bulletin*, 1960, v. 57, 162.]

GANCARZ, Z. Charakterystyka ognisk epidemicznych włośnicy w Polsce w latach 1954–1959. [**Characteristics of Epidemic Foci of Trichiniasis in Poland between 1954 and 1959**] *Przegląd Epidemiol.* Warsaw. 1961, v. 15, No. 1, 1–14, 2 figs. [29 refs.] English summary.

A marked increase in the incidence of trichiniasis has been observed in Poland in recent years; whereas 0·13 to 0·68 case per 100,000 was recorded annually between 1919 and 1937, the incidence from 1946 to 1954 ranged from 0·72 to 3·89 per 100,000 in the absence of any recorded increase in other countries. During the latter period 4,039 cases were notified, with 25 deaths (0·62%). 1,602

(39·6%) occurred in 7 epidemic foci with more than 50 each, and 892 (22·1%) from 48 foci with 10–50 cases. The distribution of the foci is shown on a map; the Warsaw province was most affected with 1,412 cases, followed by Bydgoszcz province with 817. The incidence of trichiniasis in pigs between 1954 and 1959 was highest in Białystok province (0·213%), followed by Warsaw province (0·062%). Among 85 epidemics in which the source of infection was traced pork was responsible in 45 (53·0%), and 70 (82·4%) occurred in the absence of official control of slaughter. In 15 epidemics (1,051 cases) the meat products responsible had been officially declared free from *Trichinella*. *D. J. Bauer*

GANCARZ, Z. & DYMEK, E. Masowe zachorowania na włośnice w Bydgoszcz w 1959 roku. [**Outbreak of Trichiniasis in Bydgoszcz in 1959**] *Przegląd Epidemiol.* Warsaw. 1961, v. 15, No. 1, 15–25, 1 fig. [15 refs.] English summary.

An epidemic of trichiniasis occurred in Bydgoszcz, Poland, in 1959, with a total of 308 recognized cases. 169 patients (54·8%) were workers in a meat factory, 27 (8·8%) were members of their families, and the remainder had no connexion with the factory. The outbreak was ascribed to the eating of pork sausage produced in the factory, but attempts to find the parasite in 25 samples of sausage were unsuccessful. Most cases were mild, and only 21 severe cases were observed. The average duration of stay in hospital was 1–2 weeks (60 of 116 patients, 51·7%), and the duration of illness did not exceed 1 week in 57 of 234 patients (24·4%), or 1–2 weeks in 61 patients (26·1%). Among the total number of patients the most frequent symptoms were headache and general weakness (293 patients, 95·1%), muscle pains (281, 91·2%), fever and sweats (272, 88·3%) and swelling of the eyelids (270, 87·6%). Eosinophilia of 21–50% was found in 121 patients (39·3%). In 151 patients examined, serological tests (precipitation, complement-fixation) were positive in 125 (83·1%).

D. J. Bauer

SHIELDS, L. H., SMITH, D. A., COOK, R. W., Jr., WITTE, E. J. & LINDSEY, G. D. **A Local Outbreak of Trichinosis.** *Ann. Intern. Med.* 1961, Apr., v. 54, No. 4, 734–44, 1 fig. [11 refs.]

An outbreak of trichinosis occurred in Lykens, Pennsylvania, in which 6 patients were admitted to hospital in 8 days. Visits to the homes of the families involved and other possibly infected groups revealed another proved case and 10 suspected cases in which 6 subjects had suggestive symptoms and 4 were symptom-free but showed eosinophilia. None of the suspects had positive serological tests. Of the 7 patients with confirmed diagnosis 6 admitted tasting uncooked sausages.

The differential diagnosis of trichinosis is discussed, and the variety and alteration of signs and symptoms during infection are tabulated. Diarrhoea of 27 days' duration responded rapidly to corticotrophin. Temporary electrocardiographic T-wave changes occurred in 3 patients. On lumbar puncture 3 patients showed raised cerebrospinal fluid pressure but there was no direct evidence of central nervous system involvement. In 6 patients in hospital leucocytosis varied between 10,000 and 26,000 per cmm. and eosinophilia from 25%

to 63% but the counts were normal 6 months later. All 7 patients in whom the disease was confirmed showed positive bentonite flocculation tests but only 2 showed positive complement fixation. Skin tests were positive in all the hospital patients. The sedimentation rate was little increased. Persistent oedema of one leg lasted over 6 months in 3 proved cases and persistent periorbital oedema in another.

Epidemiological investigation revealed one common source of pork in all cases proved or suspected, but it was impossible to trace individual carcasses to the farms of origin to obtain data on feeding. Cooking of garbage fed to pigs is obligatory in all States but other reservoir hosts remain infected. In Pennsylvania trichinosis has not declined over the last decade as it has in the United States of America generally; the possible reasons are discussed. *T. H. Davey*

GIBBS, H. C., MACQUEEN, K. F. & PULLIN, J. W. **The Effects of Cobalt 60 Radiation on *Trichinella spiralis* in Meat.** *Canadian J. Pub. Health.* 1961, June, v. 52, No. 6, 232–40, 4 figs. [20 refs.]

"Increase in the level of irradiation to which larval *T. spiralis* in meat were subjected resulted in a proportionately increased inhibitory effect on maturation, as estimated by the number developing to adults in the host.

"At lower levels of irradiation (6,000–12,000 rad.) even though inhibition of maturation was not pronounced, partial or complete inhibition of the reproductive potential of adult worms developing from irradiated larvae was observed.

"The numbers of larvae *in utero* in those females not rendered sterile by exposure as larvae to 9,000 and 12,000 rad. were much less than the numbers of larvae *in utero* in the control females.

"The effect of irradiation on trichinae in meat was independent of the numbers of larvae present in the meat.

"The type of meat in which the trichinae were contained did not influence the effects of gamma irradiation on these larvae."

INSTITUTO POLITECNICO NACIONAL. **Libro homenaje al Dr. Eduardo Caballero y Caballero, jubileo 1930–1960.**

This book was reviewed on p. 972.

L. DEFICIENCY DISEASES

NUNES, J. A. P. A alimentação na Baixa de Cassange. Inquéritos de consumo e nutricionais campanhas alimentares e obras de fomento. [**Survey of Food and Nutrition and Protective Measures in the Baixa Cassange Area, Angola**] *Anais Inst. Med. Trop.* Lisbon. 1960, Jan.–June, v. 17, Nos. 1/2, 283–435, 3 maps & 63 graphs, English summary.

AMERICAN PUBLIC HEALTH ASSOCIATION, INC. **Control of Malnutrition in Man.** Prepared by the Subcommittee on Control of Nutritional Diseases [SEBRELL, W. H., Jr., Chairman]. pp. vi + 140. 1960. New York 19: 1790 Broadway, N.Y., U.S.A. [$1.50.]

This volume, according to an accompanying leaflet issued by the American Public Health Association, "has been designed and written primarily for the information and convenience of the practising physician, nurse, food and nutrition consultant and all others involved in the community control of nutrition". Some 30 authors, mainly American and recognized authorities in the fields covered, have contributed. Apart from the Introduction, which includes sections on "Normal Nutrition and Food Practices" by C. G. KING, "The Physical Signs of Malnutrition" by N. JOLLIFFE and "National and International Public Health and Agricultural Organizations Concerned with Nutrition" by J. M. HUNDLEY, there are 4 sections dealing respectively with "Protein and Calorie Malnutrition", "Vitamin Deficiencies", "Mineral Deficiencies" and "Other factors".

The contributions by the various authors, which in general follow a uniform pattern, convey a great deal of information in condensed form. Care and accuracy are evident. The emphasis throughout most of the book is on the clinical aspects of nutrition, though prevention and control are not neglected. It is essentially a handbook for reference purposes, rather than a book to be read from cover to cover, and is likely to appeal more to physicians than to workers concerned with a broader approach to problems of nutrition.

W. R. Aykroyd

MUNDEL, G., FISCHL, J. & VARSANO, D. **Malnutrition in Infants in Israel. (A Sociological, Clinical and Biochemical Investigation.)** *J. Trop. Pediatrics.* London. 1961, June, v. 7, No. 1, 23–8, 3 figs. [13 refs.]

78 malnourished and 56 normally nourished children under 3 years of age, admitted to hospital with various acute conditions, were included in the investigation. A body weight of at least 30% below the 50th Stuart percentile (U.S.A.) was taken as the criterion for under-nutrition. The majority of the under-nourished children came from poor homes and large families. They were not weaned earlier than the control group, but were given foods of animal origin and fruits and vegetables at a later age. The authors comment that this might have been due to a higher incidence of acute infections, especially gastroenteritis, caused by poor hygiene in the homes.

When the acute infection had been treated, X-ray examinations of the wrists, blood counts, stool examinations, oral glucose tolerance tests and chylomicron counts were done on all the children. In addition, estimations of the following in blood serum were made: urea, uric acid, ascorbic acid, total protein and protein fractions, thymol turbidity, alkaline phosphatase, calcium, phosphorus, sodium, potassium, diastase, cholinesterase and serum iron. The glucose tolerance and chylomicron curves were consistently flattened in the under-nourished group, indicating impairment in absorption. The only other significant findings were lowered levels of cholinesterase and ascorbic acid. Haemoglobin levels and total proteins were also somewhat decreased, but there was too much

variation in the values to show a significant difference. This investigation is one more demonstration of the fact that many serum biochemical estimations do not help in the detection of general malnutrition, since the results obtained in well-nourished and malnourished groups do not show clear-cut differences.

Ruth Schwartz

El-Ridi, M. S. & Ismail, A. A. **Cyanocobalamine in Pellagra.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 11, 836–45. [33 refs.]

In 2 patients suffering from pellagra with signs of involvement of the spinal cord, a vitamin B12 saturation test showed a high retention of the vitamin. In a discussion of the part played by different vitamin deficiencies in causing the signs and symptoms of the disease, it is suggested that B12 deficiency may be responsible for the cord degenerations as manifested by signs of posterior column affection and exaggeration of the tendon reflexes. This deficiency presumably is secondary to an atrophic gastritis. *R. Passmore*

Waterlow, J. C., Cravioto, J. & Stephen, Joan M. L. **Protein Malnutrition in Man.** *Advances in Protein Chem.* 1960, v. 15, 131–238, 3 figs. [Numerous refs.]

This is a review of protein malnutrition in man in all aspects so far studied. A brief introduction outlines the history of the recognition of the syndrome, concluding with a discussion of nomenclature, which is still a subject of controversy. The authors themselves make a distinction between the disease which they name "kwashiorkor", and the process leading to it, "protein malnutrition". The main part of the review is divided into two sections. The first of these deals with the medical and public health aspects of the disease, *i.e.* its clinical features and diagnosis, incidence, treatment and prevention. Most of the information presented is now well known, but the authors give a clear and concise account of an important public health problem and a comprehensive list of references. The final paragraphs of this section, following on the subject of prevention, contain an interesting discussion of protein requirements and the limitations of the various methods for determining these.

The second half of the review deals with the biochemical aspects of protein malnutrition. It begins with a description of the biochemical changes that have been found in kwashiorkor: changes in body composition; the losses and distribution of protein in different parts of the body; the retention and accumulation of fats, especially the infiltration of fat into the liver; the accumulation and redistribution of body water; changes in electrolyte concentrations and hormonal disturbances. This is followed by a discussion of the factors which lead to these changes. There is a brief account of what little information is available about derangements in carbohydrate and fat metabolism, but most of the discussion is concerned with protein metabolism. Nitrogen absorption and retention are considered in detail. A description of changes in blood amino acids and their excretion precedes a detailed account of protein synthesis and turnover. Different methods of labelling serum protein, isotopically, immunologically, or by the use of dyes, in the study of protein breakdown and synthesis, are discussed critically. Despite the limitations of such methods there is now

enough evidence to indicate that the rate of protein catabolism is not substantially changed in protein deficiency, that there is probably an increased re-utilization of tissue amino acids, and that adjustment to depletion varies markedly in different body tissues. The section concludes with an account of the use of enzyme estimations in serum and other tissues in kwashiorkor. Unfortunately this theoretically promising approach, which has long been a special interest of one of the authors, J. C. Waterlow, has so far produced few conclusive data.

Ruth Schwartz

THERON, J. J., MEYER, B. J. & CONRADIE, F. M. **Serum Iron and Serum Copper Levels in Kwashiorkor.** *Proc. Nutrition Soc. Southern Africa.* 1960, v. 1, 24–30, 3 figs. [23 refs.]

The investigation of the serum iron in South African Bantu children is of particular interest because a high serum iron has been discovered and investigated in Bantu adults. The present investigation deals with normal children and children with kwashiorkor. In addition ceruloplasmin and serum paraphenylenediamine oxidase were also measured; both are copper-carrying enzymes.

The mean value of serum iron in 13 normal Bantu children was about 60 μgm. per 100 ml. serum, and the serum iron values in 16 kwashiorkor patients did not differ significantly. An interesting by-product was that there was no correlation at any stage between the iron content of the serum and the beta globulin fraction. On the other hand serum copper values of kwashiorkor children were, on admission, considerably lower than those in normal children. Within 28 days of treatment the mean values had returned to normal. The ceruloplasmin level and paraphenylenediamine oxidase acitivity were also lowered on admission and rose to normal within 4 weeks of treatment.

H. Lehmann

EDOZIEN, J. C. & PHILLIPS, E. J. **Partition of Urine Nitrogen in Kwashiorkor.** *Nature.* 1961, July 1; v. 191, 47–9, 2 figs. [12 refs.]

The authors refer to previous work which suggested that there was a higher amino-acid excretion in the urine of children with protein deficiency (kwashiorkor), than in normal subjects [this *Bulletin*, 1959, v. 56, 968; 1960, v. 57, 746]. The present report follows up this finding and relates it to higher content in "bound amino-acids" which are excreted as peptides. In addition there is a higher level of uric acid in the serum in kwashiorkor.

The authors suggest that the peptiduria might be associated with the failure of protein synthesis or with the deficiency of key amino acids which are required to link the peptide chains together.

H. Lehmann

WHITEHEAD, R. G. & ARNSTEIN, H. R. V. **Imidazole Acrylic Acid Excretion in Kwashiorkor.** [Correspondence.] *Nature.* 1961, June 17, v. 190, 1105–6.

Imidazole acrylic acid is a known metabolite of histidine. It has been isolated from the urine of 12 children severely ill with kwashiorkor in amounts

ranging from 10 to 80 mgm./12 hours. It may arise from excessive breakdown of histidine, associated with the relatively large amounts of nitrogen excreted in the urine in this disease [this *Bulletin*, 1960, v. 57, 1203]. *R. Passmore*

KRUT, L. H., HANSEN, J. D. L., TRUSWELL, A. S., SCHENDEL, H. E. & BROCK, J. F. **Controlled Field Trial of a Bread Diet supplemented with Lysine for Children in an Institution.** *South African J. Lab. & Clin. Med.* 1961, Mar., v. 7, No. 1, 1–12, 3 figs. [44 refs.]

Wheat protein is deficient in lysine, but though experiments have shown that lysine supplementation of wheat can prevent fatty infiltration of the liver in rats fed on a low-protein diet, many different factors are involved. In this field trial at an institution for destitute non-white children, 58 ambulant children, able to feed themselves, were divided into two equal groups, matched for age (4·54–4·57 years), weight (14·22–14·35 kgm.), height (96·0–96·7 cm.), skinfolds (28·7–27·5 mm.), serum albumin (4·01–4·04 gm.%), serum globulin (3·43–3·33 gm.%), haemoglobin (11·4–11·5 gm.%), haematocrit (38·4–38·3%). Both groups were given a vegetarian diet of standard bread sandwiches containing butter or margarine and jam or syrup in known amounts, with vegetables, fruit and multivitamin and iron tablets. The bread, containing 6·4% protein (N × 5·8), and made from 87% extraction flour, was fed *ad libitum*; vegetables and fruit containing not more than 1·1% protein were offered in approximately equal helpings. Bread provided 88·8% of the protein and 52·4% of the calories. Both groups received an amino-acid supplement in a standard solution given daily in a sweet drink before each of 3 main meals. In one group the amino-acid was lysine at a dosage of 1 gm. per day (as l-lysine HCl); in the matched control group it was glycine given in an isonitrogenous dosage of 0·822 gm. per day.

The trial was made in 2 stages. The first stage lasted for 6 weeks, and was followed immediately by the second stage in which the groups were changed over—the former glycine group receiving the lysine supplement and *vice versa*. Thus each group served in turn as a control for the other. The second stage had to be stopped after 5 weeks owing to falling serum-albumin levels, and the appearance of oedema.

Details are given of findings before and after each stage of the trial. 45 children completed the full trial; in the two stages 46 (22 + 24) received lysine and 49 (28 + 21) received glycine. Over the two stages of the complete trial, the mean protein and calorie intake per day was the same for both lysine (1,623 calories, 24·6 gm. protein) and glycine (1,600 calories, 24·0 gm. protein). Significant differences observed were in body weight (lysine increased 0·42 kgm., glycine increased 0·07 kgm. $P < 0·02$); haematocrit (lysine fell 0·93%, glycine rose 0·65%, $P < 0·001$); serum albumin (lysine fell 0·36 gm., glycine fell 0·60 gm./100 ml., $P < 0·01$). The protein efficiency ratio—PER = weight gain (gm. per day) divided by protein intake (gm. per day)—was 0·22 for lysine and 0·04 for glycine. No significant differences were found between lysine and glycine in comparisons of mean changes of height, skinfold thickness, and serum globulin. The trial was complicated by outbreaks of influenza and chicken pox.

It is concluded that: lysine-supplementation of this bread diet as assessed by serum-albumin concentration and body weight was beneficial, as compared with

a control group receiving an isonitrogenous glycine supplement; that this effect could not be ascribed to greater protein or caloric intake, but that it was due to improvement of the biological value and utilization of wheat protein by the lysine; that the fall in serum albumin, despite lysine supplementation, indicates that bread of low-protein content (6·4%) is unsuitable as the principal protein source for young children. *T. P. Eddy*

HAEMATOLOGY

THERON, J. J., MEYER, B. J. & STICKLER, E. **The Incidence of Hypochromic Anaemia in Pregnant Bantu Women.** *South African Med. J.* 1961, Apr. 29, v. 35, No. 17, 350–52. [10 refs.]

In previous surveys in the Johannesburg area a low incidence of hypochromic anaemia was found in Bantu women [this *Bulletin*, 1954, v. 51, 974], whereas in a survey in Capetown a high incidence was found in Bantu as well as in European and Coloured women. The authors have investigated 194 pregnant Bantu women in the Pretoria area, and also 32 non-pregnant women of the same social group as well as 38 Bantu nurses.

The mean haemoglobin of the pregnant women was 12·5 gm. per 100 ml., with a standard deviation of 1·26; that of the non-pregnant women was similar, 12·1 gm. per 100 ml. with a standard deviation of 1·4; while that of the nurses, who were of a superior socio-economic status, was higher, 13·34 gm. per 100 ml. with a standard deviation of 1·64. The higher level of the nurses indicates the importance of matching social groups in comparing different series. Only 2 (1%) of the pregnant Bantu women had a haemoglobin level below 10 gm. per 100 ml., the normal standard of anaemia in pregnancy, compared with 24% in a Dublin and 14% in a North Staffordshire survey.

Analysis of the course of events during pregnancy by comparison of values in the period up to 20 weeks, from 21 to 30 weeks, and from 31–40 weeks showed that there was a significant drop in mean haemoglobin level in the first half of pregnancy, but none thereafter. The packed cell volume however showed a significant rise in the second half of pregnancy. The authors note that it has been suggested that the low incidence of hypochromic anaemia is associated with a high iron intake, and are planning further investigations on this.

[It has been found in East Africa that hypochromic anaemia is more common on the coast, and less so in the highlands near Nairobi. This may have some relevance to the present problem.] *A. C. E. Cole*

FOY, H. & KONDI, Athena. **Report on Incidence, Aetiology, Treatment and Prophylaxis of the Anaemias in the Seychelles: A Study in Iron-Deficiency Anaemias and Ancylostomiasis in the Tropics.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 25–45, 3 maps & 2 figs.

In the 3 largest islands of the Seychelles group, Mahé, Praslin, and La Digue, with a population of about 40,000, the authors investigated the prevalent

anaemia as was done in Mauritius [this *Bulletin*, 1961, v. 58, 712]. The only type of anaemia found was microcytic hypochromic, responding to iron and associated with hookworms; no megaloblastic anaemia was found even in women in the 3rd trimester of pregnancy. In general the anaemia was less severe than in Mauritius; the hookworm infection rate was mostly in the region of 26 to 41%, and an estimated "average" blood loss in those infected would be about 20 ml. a day. In La Digue, where infection was highest, 4·5% of persons of all ages had Hb levels of under 8 gm./100 ml., but for all three islands the figure was 2·1%, with women and pre-school children most affected.

As in Mauritius, the more severe anaemias were associated with heavy hookworm loads, due mainly to poverty, poor hygiene, and the absence of footwear; and with the absence (or very recent occurrence) of worming. Moreover the relation between hookworm load, iron depletion, and the tempo of blood regeneration on iron therapy, was found to be the same as the authors had met elsewhere in the moist tropics. They advocate the same measures for a population that cannot immediately attain high sanitary standards—fortification of the diet with iron, vermifuges, and the use of plimsolls with the rubber sole carried well up the sides. Such shoes can be obtained in Kenya at five shillings a pair. For anaemic patients a simple iron preparation by mouth is adequate. Incomplete response is usually due to a failure to take the iron or to the presence of some additional infection. *Alan B. Raper*

Sanghvi, L. M., Misra, S. N. & Banerjee, K. **Cardiac Enlargement in Chronic Severe Anemia.** *Circulation*. New York. 1960, Sept., v. 22, No. 3, 412–18, 4 figs. [22 refs.]

In India severe curable anaemias associated with a high incidence of cardiac enlargement and congestive failure are common and this study of 150 cases was undertaken to determine the nature of this cardiac enlargement. Patients were selected only if they had anaemia of at least three months' duration, haemoglobin of less than 8 gm.% and if after treatment in hospital no evidence of cardiovascular disease unassociated with anaemia remained. There were 93 male and 57 female patients, their ages ranged from 10 to 55 years and their haemoglobin from 1 to 8 gm.% with a mean of 3·5 gm.%. The heart was considered to be enlarged if the cardiothoracic ratio was greater than 50%.

Such cardiac enlargement was found in 120 patients, including 43 with heart failure. Of 23 with more than 5 gm. haemoglobin % none had heart failure and only one had a cardiothoracic ratio greater than 55%. Of 107 patients without failure, 90 had a cardiothoracic ratio of 55% or less and only one a ratio greater than 65%. A cardiothoracic ratio of less than 55% occurred in 10 patients with failure and in 31 with less than 3 gm. haemoglobin %. The incidence of enlargement was almost equal in males and females but there was more cardiac failure among the women. The age of the patient, and the course and duration of the anaemia seemed not to bear any significant relation to the incidence of cardiac enlargement and failure.

The enlargement was generalized in 43 patients, predominantly left-sided in 31, predominantly right-sided in 43 and pear-shaped in 3. In 2 of these 3, clear straw-coloured fluid was withdrawn from the pericardial sac but was shown to be contributing only partially to the apparent cardiac enlargement.

Right ventricular enlargement was usually associated with tachycardia and left ventricular enlargement was not.

Cardiac size decreased rapidly with correction of the anaemia and relief of the cardiac failure. Some enlargement, however, persisted after cure of the anaemia in 28 patients and in these the cardiothoracic ratio ranged from 52 to 58% with an average of 54%. Enlargement persisted significantly more often in patients with cardiac failure and in those with less than 3 gm. haemoglobin % than in those without failure and in those with more than 3 gm.% haemoglobin. In some patients it is surmised that the heart would return to normal size during the course of time. Dilatation alone was considered to be responsible for the enlargement, and associated coronary disease was thought to be improbable as persistent enlargement occurred irrespective of the patient's age.

Enlargement is believed to be due to the anaemia *per se* and is likely to occur when the haemoglobin falls below 8 gm.%. There was no consistent relationship between cardiac size and haemoglobin level on admission but there was a significant difference in cardiothoracic ratio and incidence of cardiac failure at different haemoglobin levels. Cardiac failure with considerable enlargement occurred only when the haemoglobin was 5 gm.% or less. *A. W. Woodruff*

ALLISON, A. C., CHARLES, L. J. & MCGREGOR, I. A. **Erythrocyte Glucose-6-Phosphate Dehydrogenase Deficiency in West Africa.** [Correspondence.] *Nature*. 1961, June 24, v. 190, 1198–9.

High rates of deficiency in erythrocyte glucose-6-phosphate dehydrogenase have been reported from malarious parts of Africa, and low rates from non-malarious parts. The authors now report on the following specimens, all from males:—

Locality	No. tested	No. of enzyme deficient	Percentage of enzyme deficient
Northern Nigeria	136	28	20·6
Southern Ghana	96	23	24·0
Gambia	103	16	15·5

The tests suggest that the enzyme deficiency gene is widespread in West Africa.

[See also this *Bulletin*, 1961, v. 58, 944.] *Charles Wilcocks*

SUAREZ, R. M., OLAVARRIETA, Sara, BUSO, R., MEYER, L. M. & SUAREZ, R. M., Jr. **Glucose-6-Phosphate-Dehydrogenase Deficiency among certain Puerto Rican Groups.** *Bol. Asoc. Med. de Puerto Rico*. 1961, Feb., v. 53, No. 2, 41–8, 1 pl. [12 refs.]

The incidence of G6PD deficiency in 1,047 Puerto Ricans belonging to a heterologous group was 3·6%, and in 199 persons of Negro stock in an area recently malarious it was 3·5%. None of 163 Caucasians tested in the island was affected. *Alan B. Raper*

BOWMAN, J. E. & WALKER, D. G. **Virtual Absence of Glutathione Instability of the Erythrocytes among Armenians in Iran.** *Nature*. 1961, July 15, v. 191, 221–2. [16 refs.]

GREENBERG, M. S. & WONG, Helena, with the technical assistance of Barbara WENZEL. **Studies on the Destruction of Glutathione-Unstable Red Blood Cells. The Influence of Fava Beans and Primaquine upon such Cells *in vivo*.** *J. Lab. & Clin. Med.* 1961, May, v. 57, No. 5, 733–46, 4 figs. [30 refs.]

SINISCALCO, M., BERNINI, L., LATTE, B. & MOTULSKI, A. G. **Favism and Thalassaemia in Sardinia and their Relationship to Malaria.** *Nature.* 1961, June 24, v. 190, 1179–80, 2 figs. [15 refs.]

This is an important study of the effect of malaria on three mutant human genes, and on their interactions. Glucose-6-phosphate deficiency, thalassaemia, and colour-blindness all occur in Sardinia. The gene frequency of the first two was determined in 19 Sardinian villages, and correlated with the altitude and the malarial endemicity (before eradication) in these villages. The four highest villages (above 550 metres), with low malarial endemicity, showed the lowest incidence of thalassaemia and G6PD deficiency—the opposite of the situation in low-lying villages. Analysis showed a positive correlation between each anomaly and malaria, and between the two anomalies themselves, strongly suggesting that both genes were subject to selection by malaria. The maximum gene frequency for thalassaemia (14%) was lower than that for G6PD deficiency (35%), probably because of the greater lethality of the homozygous state in the former over the hemizygous state in the latter.

In persons deficient in G6PD, the added presence of thalassaemia resulted in a less severe depression of the enzyme. This might be because the shortened red cell life-span in thalassaemia meant that there would be a higher proportion of young red cells, with higher enzyme content, in the blood. Agreeing with this was the clinical fact that a history of favism attacks was significantly less common in persons with the combined defect than in those with only the enzyme defect.

Conversely, if malarial activity depends on high enzyme levels, the presence of both defects should encourage malarial morbidity, though adding some protective effect from thalassaemia—a complex situation that requires further study.

An interesting result emerged in respect of colour-blindness. It was present together with G6PD deficiency in 4 large kindreds, and there was no instance of recombination, thus demonstrating close linkage of the genes. The incidence of colour-blindness was later found to be positively correlated with past malarial endemicity; that is to say, malaria had effected the selection of a neutral gene because of that gene's close linkage with another gene that was highly adaptive.

Alan B. Raper

VALŠIK, J. A., KOMENSKÝ, J. A., LEHMANN, H. & NICHOLS, Joan. **Absence of Abnormal Haemoglobin in 234 Children in South Slovakia (including 63 Gypsies).** Reprinted from *Man.* 1960, 195.

INGRAM, V. M. & STRETTON, A. O. W. **Human Haemoglobin A_2: Chemistry, Genetics and Evolution.** *Nature.* 1961, June 17, v. 190, 1079–84, 4 figs. [31 refs.]

NEEL, J. V., ROBINSON, A. R., ZUELZER, W. W., LIVINGSTONE, F. B. & SUTTON, H. E. **The Frequency of Elevations in the A_2 and Fetal Hemoglobin Fractions in the Natives of Liberia and Adjacent Regions, with Data on Haptoglobin and Transferrin Types.** *Amer. J. Human Genetics.* 1961, June, v. 13 No. 2, 262–78. [Numerous refs.]

"Data from Liberia on 1) the frequency of individuals whose hemoglobin on paper electrophoresis appears all-S or all-C in type, 2) the frequency of individuals with an elevation of the A_2 component of hemoglobin, and 3) the frequency of individuals with gross elevations in the amount of fetal hemoglobin present, all combine to suggest that four to five per cent of the population may be heterozygous for a gene of the thalassemia complex.

"Data are presented on the frequency of the serum haptoglobin and transferrin types, and an attempt made to relate the findings to the cline for the sickle cell gene previously demonstrated in Liberia."

See this *Bulletin*, 1957, v. 54, 82.

DORMANDY, Katharine M., LOCK, S. P. & LEHMANN, H. **Haemoglobin Q-Alpha Thalassaemia.** *Brit. Med. J.* 1961, June 3, 1582–5, 6 figs. [18 refs.]

A 10-month-old boy from Thailand showed hypochromic anaemia with high serum iron (226 μgm./100 ml.). His haemoglobin consisted of Hb Q, a minor component which from its relation to the major was designated Hb Q_2, and about 5% of Hb Bart's. Inclusion bodies resembling those seen in Hb H disease were demonstrated, and there was possibly 0·5% of this haemoglobin in the haemolysate. The father was a carrier of Hb Q trait, and he, too, showed Hb Q_2 as well as Hb A_2. The mother was shown to have thalassaemia minor, without any increase in Hb A_2 or Hb F, and with inclusion bodies suggesting the presence of Hb H.

The following explanation is given. The mother's thalassaemia was of the type with an α-chain abnormality, which explains why there was no increase in Hb A_2 and Hb F, both of which contain normal α-chains. The child inherited this anomaly, and also the Hb Q trait from its father. Hb Q is produced by an anomaly in α-chains. Hence the child had no genetic basis for the production of normal α-chains, and could produce no Hb A, Hb A_2, or Hb F. His blood contained "2·4%" of an alkali-resistant component, explained by the partial alkali-resistance of Hb Bart's. His production, in diminished quantity, of abnormal α-chains led to the development of the new syndrome Hb Q-α-thalassaemia, and left an excess of γ- and β-chains, which produced Hb Bart's (γ_4) and a trace of Hb H (β_4). *Alan B. Raper*

FIRSCHEIN, I. L. **Population Dynamics of the Sickle-Cell Trait in the Black Caribs of British Honduras, Central America.** *Amer. J. Human Genetics.* 1961, June, v. 13, No. 2, 233–54. [Numerous refs.]

De Carvalho, A. R. L., De Almeida, M. & Bandeira, V. Anatomia patológica da drepanocitose (estudo de 7 casos). [**Morbid Anatomy of Sickle-Cell Anaemia**] *Rev. Assoc. Med. Brasileira.* 1961, Feb., v. 7, No. 1, 41–51, 8 figs. [18 refs.] English summary.

This paper is based on the findings at necropsy on 7 subjects at the Pathology Department of the University of Recife (Pernambuco, Brazil).

The subjects' ages ranged from 2 to 43 years, 3 were female but in only one (a 2-year-old girl) was the diagnosis made during life. Individual case histories are given.

All were found to have large numbers of sickle cells which seemed to be cramming the various vessels of the body, especially the capillaries and veins, so as to cause in some instances veritable thrombi; there was marked dilatation of the vessels also. Careful mention is made of the fact that all the subjects were suffering from a number of other conditions (some of which might very well have proved fatal).

The vascular occlusions were no doubt responsible for the numerous infarcts found. As regards particular organs, the spleen showed marked congestion, dilatation of the sinuses and prominent follicles but no atrophy. The liver was enlarged, congestion of the perilobular channels was evident even in patients with cardiac insufficiency; obstruction of the portal rami and of the perilobular sinusoids was found in 4 cases. A fine fibrinoid mesh was evident between the sinusoids, which the authors think is due to infiltration of the plasma through the rouleaux of sickle cells. In the lungs, besides congestion and oedema, there was obstruction of the interlobular capillaries and even haemorrhage. The kidneys showed marked sickling in all the vessels; there was particular congestion of the peritubular capillaries of the medulla and a special form of congestion in the glomeruli.

The authors' comments and conclusions are that the marked sickling visible even in sections is pathognomonic, while the general vascular congestion especially of the capillaries is also of great importance. Mention is made of the falciform crises as a cause of a severe or fatal heart attack (this might well have been the cause in the girl aged 2 who died during convalescence from mumps).

Particular attention is drawn to the fact that although the number of cases was admittedly small, in 3 there were malformations of some kind, especially cysts of the liver or spleen, and the suggestion is put forward that sickling may be a kind of malformation as the other malformations found may not have been due solely to chance. The authors finally suggest that there is a possibility that persons with the sickle-cell trait may develop a sickling crisis if exposed to hypoxic conditions.

[See also Edington, this *Bulletin*, 1955, v. 52, 925.] *W. K. Dunscombe*

Lie-Injo Luan Eng, Tjoa Gie Tjiang & Kho Lien Keng. **Splenectomy in a Case of Chronic Haemolytic Anaemia associated with Haemoglobin H.** *J. Trop. Med. & Hyg.* 1961, June, v. 64, No. 6, 136–9, 4 figs. [10 refs.]

"A case of chronic haemolytic anaemia associated with Hb H, in a pure Chinese girl of 13 years old is described. This represents the sixth case reported from Indonesia. Splenectomy was performed with a favourable result. Physical

and haematological findings both before and after removal of the spleen are described.

"(Since the completion of this study, two other cases of chronic anaemia associated with haemoglobin H have been found.)"

SILVESTRONI, E., BIANCO, I. & BRANCATI, C. **Haemoglobin *P* in a Family of Southern Italian Extraction.** [Correspondence.] *Nature*. 1961, July 15, v. 191, 292–4, 3 figs.

See this *Bulletin*, 1960, v. 57, 286.

TOXOPLASMOSIS

FUCHS, V., JÍROVEC, O., JÍRA, J. & BOZDĚCH, V., with the assistance of V. KUBĚNKOVÁ. Diagnostické reakce na toxoplazmózu u normální porodnické populace. I. Sdělení. Frekvence toxoplazminového testu ve vztahu k věku a zaměstnání a vztah mezi kožním testem a komplement-fixační reakcí. **[Diagnostic Reactions for Toxoplasmosis in the Normal Obstetric Population. I.]** *Časopis Lékařů Českých*. Prague. 1961, June 30, v. 100, No. 26, 823–6. [10 refs.]

The English summary appended to the paper is as follows:—

"The authors examined 1750 normal parturient women by means of the toxoplasmin skin test and 425 in addition by the complement-fixation reaction. The average frequency of positive skin tests in women aged 21–40 years in Prague was 32·2 per cent. In women engaged in the health services (doctors, nurses) the incidence was 42·6 per cent, the difference being statistically significant. The incidence of positive tests, as far as could be revealed, did not depend on the blood group or Rh factor. In women examined simultaneously by the two tests they were in agreement in 90·4 per cent, discrepancies were found only in 9·6 per cent. A perfect agreement of results of the complement-fixation reaction was obtained in the venous blood of the mother and the umbilical blood."

GIBSON, C. L. & JUMPER, J. R. **The Prevalence of Canine Toxoplasmosis in Memphis, Tennessee.** *J. Parasitology*. 1960, Oct., v. 46, No. 5, 559–65, 1 fig. [17 refs.]

Stray dogs from the pound in Memphis, Tennessee, were examined in 1954 and 1955 for toxoplasmosis by the Sabin-Feldman dye test and by inoculating triturated brain, liver and spleen into white mice. Two additional blind passages in mice were also made. The mice were given 5 mgm. of cortisone in an attempt to increase their susceptibility to the organism. [A better method is to employ the naturally more susceptible multimammate rat for such isolations.]

In the first series, 45% of 137 gave a positive dye test (15% at titres above 1 in 16) but no isolations were made. In the second series, 106 of 663 dogs (16%) showed a dye test titre of above 1 in 16; 54 of these animals were killed and the tissues were inoculated into mice. Organisms were recovered in two instances, from dogs with dye test titres of 1 in 256 and 1 in 1024 respectively, but the strain disappeared on the third passage. This suggests that the mouse is ill adapted to the dog strain.

There was little difference in the rates between males and females; adults showed a higher rate than juveniles; low titres were more prevalent in dogs of rural origin. *P. C. C. Garnham*

TSUNEMATSU, Y. **Purification of *Toxoplasma* by means of Sonic Vibration and Tryptic Digestion.** *Amer. J. Trop. Med. & Hyg.* 1960, Nov., v. 9, No. 6, 556–61, 1 fig.

After unsatisfactory trials with various existing techniques for the purification of toxoplasmic suspensions obtained from the peritoneal exudate of infected mice, the author obtained good results by sonic treatment combined with tryptic digestion. For this purpose, peritoneal fluid containing the parasites was first passed through fine gauze to remove coarser particles, then diluted with normal or buffered saline. Samples of the suspension in sonic oscillator tubes were exposed to ultrasonic vibration for 15–30 seconds in order to break up the blood cells present in the mouse exudate, and the treated samples were again passed through gauze. After centrifugation of the filtrate, the sediment was suspended in a trypsin solution, which served to digest the cell débris produced by sonic treatment. Finally, trypsin and the digested matter were removed by washing and centrifugation, leaving purified toxoplasms, with properties which proved to be as follows: purity 98·7%, recovery 39·4%, infectivity amounting to 7·6% of the original samples. *C. A. Hoare*

FLECK, D. G. **Serological Tests for Toxoplasmosis.** [Correspondence.] *Nature.* 1961, June 10, v. 190, 1018–19.

In a flocculation test in which toxoplasma antigen was adsorbed on to acrylic particles, SIIM and LIND (*Acta Path. Microb. Scandinavica*, 1960, v. 50, 445) recorded that preliminary tests showed the existence of more than one toxoplasma antigen.

The present author, from the Public Health Laboratory, Swansea, absorbed a high-titre human antitoxoplasma antigen with infected mouse peritoneal exudate at 20°C. and found almost all the haemagglutinating, complement-fixing and dye-test antibodies were removed. Absorption of the same serum with human red cells coated with toxoplasma antigen as used in the haemagglutination test [this *Bulletin*, 1957, v. 54, 1464] removed the haemagglutinating antibodies, but not the other two: when the serum was absorbed with unsensitized red cells the titres of all 3 antibodies were unaffected. Control tests with normal human serum, made to exclude the effects of elution of soluble toxoplasma antigen, also showed that all 3 antibody titres were unaffected.

Another hyperimmune serum was absorbed with a toxoplasma antigen

prepared from tissue culture in HeLa cells ; the results were essentially the same as those when mouse exudate antigen was used.

Evidently the antibody measured in the haemagglutination test differs from that in the dye and complement-fixation tests. *H. J. O'D. Burke-Gaffney*

VAN DER WAAIJ, D. **Congenital Transmission of Avirulent *Toxoplasma gondii* after Experimental Infection in Mice Prior to Gestation.** *Trop. & Geograph. Med.* Amsterdam. 1960, Sept., v. 12, No. 3, 251–7, 1 graph.

The author describes experiments designed to establish the conditions under which congenital transmission of toxoplasmosis takes place in mice. Female mice were inoculated subcutaneously with cysts of an avirulent strain of *Toxoplasma* at different intervals before the onset of gestation. Eight weeks after termination of gestation the mothers and their offspring were killed and their brain smears were examined for the presence of cysts. It was demonstrated that congenital transmission to foetuses took place before 2 and after 13 weeks following infection of the mother ; moreover it occurred only when a few cysts were present in the latter. It was also shown that only mice inoculated during the first half of the gestation period produced congenitally infected offspring, whereas those inoculated in the second half had normal litters.

To determine whether absence of congenital transmission was due to development of immunity, the course of the latter was studied. These investigations suggested that (1) the negative period (between 2nd and 13th weeks) was due to the production of specific antibodies ; (2) the presence of numerous cysts in the mother induced the production of sufficient antibodies to protect the foetus from infection ; and (3) reinoculation of pregnant mice failed to produce infection of the offspring, indicating that immunity acquired during the primary infection protected the foetuses. *C. A. Hoare*

KRAMÁR, J. & VRABEC, F. **The Inoculation of Parasites *Toxoplasma gondii* into the Eyes of Albino Rats.** *Československ. Parasit.* Prague. 1960, v. 7, 245–50, 1 fig. [13 refs.]

Previous workers (with the exception of SMITH, *Brit. J. Exper. Path.*, 1956, v. 37, 248, who used a strain of low virulence) inoculated fully virulent strains of *Toxoplasma* into the eyes of highly susceptible animals. This, the authors consider, is not comparable with what happens naturally in man, who is fairly resistant and usually infected with a strain of low virulence.

To imitate human infection more closely the authors inoculated about 2 million parasites of the CB strain of *Toxoplasma*, contained in mouse peritoneal exudate to which penicillin and streptomycin were added, into the right eye of anaesthetized rats. Saline was inoculated into the left eye. They were able to isolate the parasite by mouse passage from the eyes of 2 rats which had been injected in the vitreous and to demonstrate it histologically (in the vegetative form) in the eyes of 2 others similarly injected. These successes were obtained in rats killed between 7 and 16 days after inoculation. Parasites were not found in rats killed later, nor in rats which had been inoculated in the anterior chamber or conjunctiva.

A detailed description is given of the histopathological changes, which, in the main, consisted of subacute endophthalmitis involving the uvea, vitreous and retina with formation of a cyclitic membrane.

In rats inoculated with parasites inactivated at 56°C. for 30 minutes or with filtered supernatant from centrifuged peritoneal exudate, inflammatory changes were only slightly greater than those produced by saline. *C. P. Beattie*

THIERMANN, Erica, REYES, H. & NIEDMANN, G. Comparación de diversos tratamientos aplicados en diferentes períodos de la toxoplasmosis experimental del ratón. [**Comparison of Different Treatments in Various Stages of Experimental Toxoplasmosis in the Rat**] *Biológica*. Santiago. 1960, Dec., No. 30, 9–16. English summary.

DERMATOLOGY AND FUNGUS DISEASES

BLACHÉ, R., DESTOMBES, P. & NAZIMOFF, O. Nouvelles mycoses sous-cutanées au Sud-Cameroun. [**Subcutaneous Mycoses seen in the Southern Cameroons**] *Bull. Soc. Path. Exot.* 1961, Jan.–Feb., v. 54, No. 1, 56–63, 6 figs. on 4 pls., 4 maps & 1 text fig.

This paper describes 6 cases of subcutaneous mycoses seen in 2½ years of pathological practice in Douala. None of the diagnoses is supported by culture although several attempts were made both in Douala and in Paris. The 6 cases were:—

1. A mycetoma of scalp presenting as a series of small painless nodules in the occipital region; there were no fistulae. The growths were excised and sections revealed numerous white grains averaging about 0·2 mm. in size. Microscopy showed that these grains were made up of the elements of a filamentous fungus as yet undescribed in this sort of condition.

2. A spreading tumour of the upper lip which showed histologically the characteristics of infection by *Basidiobolus ranarum*.

3. The remaining 4 cases were mycetomas of hand, arm and foot. Sections resembled those seen in mycetoma due to *Nocardia asteroides*.

Subcutaneous mycoses are encountered only sporadically in Southern French Cameroons and the responsible organisms are not those seen in Chad, Senegal and Somalia. The authors presume that this is due to climatic differences.

Ian G. Murray

BRITO, R. R. & CAPRINI, N. Blastomicose da próstata. [**Blastomycosis of the Prostate**] *Rev. Paulista Med.* 1959, Feb., v. 54, No. 2, 116–22, 4 figs.

The English summary appended to the paper is as follows:—

" A study of blastomycosis of the prostate gland is presented with note of its rarity in Brazil. The incidence of blastomycosis of the prostate gland correlated with other genito-urinary tract organs is given.

"A case is reported in which the pre-operative diagnosis was cancer of the prostate but the histopathological result was blastomycotic granulomatous prostatitis. There were also pulmonary and pharyngeal lesions.

"The differential diagnosis between blastomycosis and cancer of the prostate gland is difficult, unless there are other characteristic lesions. Blastomycosis never has its primary localization in the prostate gland."

TROPICAL OPHTHALMOLOGY

PHILLIPS, C. M. **Blindness in Africans in Northern Rhodesia.** *Central African J. of Med.* 1961, May, v. 7, No. 5, 153–8, 1 fig.

Until recently very little was known about the incidence and causation of blindness in Northern Rhodesia. The author is certainly doing his best to fill in these gaps in our knowledge. The overall incidence of blindness is considered to be between 0·5 and 0·75% but in some areas it rises as high as 2·3% where there is a higher incidence of blindness in childhood than in adulthood.

The main causal lesions of 2,701 patients examined were corneal pathology, phthisis bulbi, senile cataract and trachoma, and it is considered that the outstandingly predominant factor responsible for the first two lesions is traditional African medicine.

When all factors are taken into consideration, the author believes that 4 out of every 5 persons who have lost their sight did so from a cause that is either preventable or curable.

It is noteworthy that tropical eye diseases other than trachoma caused a negligible amount of blindness. Trachoma contributed 7·7% to the total.

The various conditions are considered individually and a table shows the distribution of the main causes of blindness. *D. P. Choyce*

SCOTT, J. G. **Trachoma in Johannesburg Townships.** *Med. Proc.* Johannesburg. 1961, June 17, v. 7, No. 12, 231–2.

A clinical survey of groups of Bantu children and old age pensioners revealed that between 10% and 40% of urban Africans had a mild form of trachoma. The diagnosis was confirmed by the Trachoma Unit, which isolated the virus from 7 of 15 cases.

Although the disease in the townships is mild and causes little economic blindness the author feels that it does warrant treatment because:—

(1) the infection causes chronic conjunctivitis with watering eyes;
(2) it persists for years if untreated and clears up rapidly with simple treatment;
(3) it is infectious and can be carried by African "nannies" to families for whom they work.

He feels that infected persons must be found and that school is an excellent place to find and treat them.

[See also this *Bulletin*, 1961, v. 58, 849.] *D. P. Choyce*

DAWSON, C., JAWETZ, E., THYGESON, P. & HANNA, L. **Trachoma Viruses isolated in the United States. 4. Infectivity and Immunogenicity for Monkeys.** *Proc. Soc. Exper. Biol. & Med.* 1961, Apr., v. 106, No. 4, 898–902, 1 fig. [12 refs.]

Working with 3 strains of trachoma virus and 1 of inclusion conjunctivitis, isolated in the United States and passed in eggs by the yolk sac route, the authors report the results of some experiments made on the eyes of rhesus and cynomolgus monkeys. Not only do they confirm their earlier work demonstrating the susceptibility of monkeys to conjunctival infection with these viruses, but they show how by follicle counts and by the microscopy of stained conjunctival smears, a quantitative estimate of the conjunctival reaction to infection can be made.

In earlier work it was shown (THYGESON *et al., Amer. J. Ophthmal.*, 1960, v. 50, 907) that monkeys could be reinfected with trachoma virus when signs of the initial infection had subsided. Confirming this, the authors report that 3 such consecutive infections failed to modify subsequent challenge, but they also find that 3 intramuscular injections of large doses of living virus, given at weekly intervals, modified the response to subsequent challenge though failing to induce solid immunity. *S. P. Bedson*

TROPICAL ENVIRONMENTAL CONDITIONS

WELBOURN, H. F. **The Effect of Tropical and Other Environmental Factors on Stature and Subcutaneous Fat in Kampala Nursery School Children.** *Arch. Dis. in Childhood.* 1961, Apr., v. 36, No. 186, 200–204, 2 figs. [16 refs.]

European children aged 4 to 5½ years living in Kampala, Uganda, were similar in height, weight, upper arm length and thickness of subcutaneous fat to those living in England. African children were smaller, lighter and had less subcutaneous fat. These difference are attributed to socio-economic and cultural factors and not to climate. *R. Passmore*

MISCELLANEOUS DISEASES

LIMBOS, P. Pathologie des corps expéditionnaires de la Force Publique du Congo Belge pendant la guerre 1940–1945. [**Pathological Conditions among Personnel in the Expeditionary Corps of the Force Publique of the Belgian Congo during the War, 1940–1945**] *Rev. Internat. Services de Santé des Armées.* Liège. 1960, Mar., v. 33, No. 3, 185–91.

SHEE, J. C. **Onyalai in an Elderly European Woman.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 239–41.

Onyalai is extremely rare in non-Africans, although STEIN and MILLER reported a case in a European and in a Chinese living in South Africa [this *Bulletin*, 1944, v. 41, 970].

The present author, from Bulawayo, Southern Rhodesia, reports a case in an elderly well-nourished European woman living under good hygienic conditions. She had been under treatment for depression and a hypochondriacal state with chlorpromazine and Carbrital and had improved considerably. On one visit, a large blood-blister was seen on the lower gingival margin: 3 days later the patient was very ill, with bleeding from the mouth and nose, and melaena.

Two large trabeculated haemorrhagic blisters were seen on the lower gingival margin, 2 on the tongue, 3 on the buccal mucosa and 1 on the soft palate. There were numerous purpuric spots on the body. The haemoglobin was 11·5 gm.%, the red cells 3·7 million and the platelets 220,000 per cmm. The patient was given vitamin K and the other drugs were stopped, as a drug reaction was suspected. Next morning the patient was weaker, mentally confused and had developed fresh bullae in the mouth. The patient was transfused and received prednisone 5 mgm. every 6 hours. Before transfusion, the platelet count had fallen to 40,000 per cmm. Next day the patient felt better, no new manifestations had occurred, and the platelet count was 65,000 per cmm. Another transfusion was given and the dosage of prednisone increased to 10 mgm. Apart from the melaena which persisted for another 5 days, no new haemorrhagic episodes occurred. The dosage of prednisone was gradually reduced and after a week of treatment a total of 160 mgm. had been given. Convalescence was protracted because of insomnia and depression. At the patient's request she was eventually prescribed her former drugs, without adverse reaction, and is now in fair health 4 years later: no recurrence of the onyalai occurred.

No reason for this illness can be hazarded: nutritional and exogenous toxic agents seem to be excluded and since the thrombocytopenia had dropped so much during the established disease it would seem to have been an effect rather than a cause of the condition.

The excellent response to blood transfusion and prednisone is noted.

H. J. O'D. Burke-Gaffney

CRUICKSHANK, E. K., MONTGOMERY, R. D. & SPILLANE, J. D. **Obscure Neurologic Disorders in Jamaica.** *World Neurology.* Minneapolis. 1961, Mar., v. 2, No. 3, 199–211, 6 figs. [36 refs.]

This report extends the previous observations [see this *Bulletin*, 1957, v. 54, 741] on this obscure disease prevalent in Jamaica, in which the principal features are spastic paraplegia and sensory losses characteristic of disease of the posterior columns. Retrobulbar neuropathy and nerve deafness are present in about a quarter of the patients. This paper gives a detailed analysis of the findings in 210 patients. In 35% the blood Wassermann reaction was positive and in 39% the dietary assessment was graded as poor. However, syphilis and nutritional deficiency can be at most only contributory factors in some instances.

Full neuropathological reports on two autopsies are given. Extensive

degeneration of the white matter of the cord was found with some involvement of the nerve cells. In one, these changes appeared to have arisen from chronic disease of the blood vessels, and it could be described as a form of vascular myelopathy.

The paper contains clear and concise accounts of the history of the disease, the circumstances under which it arises and also a good bibliography. However it throws no new light. Anyone seeking for a good mystery which requires solving need look no further than this disease in Jamaica.

[The authors mention several other accounts of unexplained neurological disorders from Jamaica and other tropical countries, including that of SCOTT (this *Bulletin*, 1919, v. 13, 372) on central neuritis, which he thought was probably due to some toxin.] *R. Passmore*

MILLER, R., Jr. & CLINGER, Doris I. **Melioidosis Pathogenesis in Rabbits. I. *In vivo* Studies in the Rabbit Ear Chamber.** *Arch. Pathology*. 1961, June, v. 71, No. 6, 629–34, 4 figs.

"The pathogenesis of melioidosis was studied in the rabbit ear chamber. Nonimmunized and immunized animals were infected with a highly virulent strain of Pseudomonas pseudomallei. Infection in the nonimmunized animal was progressive, led to complete destruction of the tissue in the chamber, and terminated in 8 days with the death of the experimental host. In the immunized animal there was temporal delay in the onset of pathologic change, and histological section at 60 days postinfection showed lesions which were focal and regressive in nature."

MILLER, R., Jr. & CLINGER, Doris I. **Melioidosis Pathogenesis in Rabbits. II. A Simplified Surgical Technique for *in vivo* Observations of Pathologic Changes in Abdominal Viscera.** *Arch. Pathology*. 1961, June, v. 71, No. 6, 635–40, 3 figs.

COCKBURN, T. A. **Eradication of Infectious Diseases. "Control" is an Unending Operation. After "Eradication," no further Effort is required.** *Science*. 1961, Apr. 7, v. 133, 1050–58, 3 figs. [27 refs.]

There are many definitions of the term "eradication", which the author uses to mean extinction of the pathogen. On this definition no infection has yet been eradicated though regional eradication has been accomplished, which implies an unstable situation. Where preventive measures must be continued only control has been achieved.

Basic requirements for eradication are discussed; they include political stability, popular support, adequate funds, personnel and equipment, and local staff for certain phases. A number of possible factors affecting eradication are discussed. For example, the evolution of a human from an animal pathogen may require study, *e.g.* zoonoses involving a domestic animal (bovine tuberculosis) can be eradicated, but not if the host is wild (yellow fever). Competition between related pathogens may permit only one to flourish; if this is eradicated, a competitor may appear. Established indigenous parasites and vectors

are more difficult to eradicate than those recently introduced. Reduction of the population of a diploid organism to a very low figure usually results in its eventual extinction because of in-breeding, but not in the case of haploid organisms. Spontaneous extinction may result from loss of fitness to survive.

Results of eradication campaigns are spectacular at first but final elimination is prolonged and difficult. Small islands are most suitable for such campaigns. Among diseases suitable for world eradication is smallpox.

Unexpected difficulties have arisen in malaria eradication and, even if this is accomplished, simian malaria may spread to man. In the case of poliomyelitis the replacement of wild strains by attenuated strains is suggested, but there are difficulties here also. Cholera can be eradicated by provision of pure water but paracholera may persist.

The author concludes that present obstacles to eradication may be resolved by techniques already under study and we may expect to be freed from the major infectious diseases within, say, 100 years. *T. H. Davey*

PARASITOLOGY: GENERAL

RICCI, M. Il parassitismo intestinale nella popolazione infantile di un' "area depressa." [**Intestinal Parasitism in Children in a "Depressed Area"**] *Riv. di Parassit.* Rome. 1961, Mar., v. 22, No. 1, 1–26. English summary.

This "depressed area" was selected for a nutrition survey in 1954 in the province of Salerno, and it covers 5 districts with a total population of 12,657; their altitudes vary between 250 and 700 metres above sea level. The parasite survey which is the subject of this paper was carried out between October 1958 and April 1960; the author also deals with a pilot survey made in a holiday camp which received children from all these 5 districts, in July and August 1958.

Graham's technique with Scotch tape was employed and, in addition, one specimen of faeces was examined from every child. The survey included the whole elementary school population—674 children aged 6–12 years—from 3 of the districts, and 129 boys, aged 6–10 years, from the other 2 districts.

The first group, which included both sexes, showed a 53·56% incidence of *Enterobius vermicularis* and over 97% of the children harboured one or more intestinal parasites. In all, 12 species of parasites were identified [including *Entamoeba coli*]. Over 86% of the children had more than one parasite, the number of species in each of these subjects varying from 2 to 7. The intensity and variety of infection generally increased with age. In the second group of boys only 11 separate species were demonstrated. *J. Cauchi*

CHING, Hilda L. **Internal Parasites of Man in Hawaii, with special reference to Heterophyid Flukes.** *Hawaii Med. J.* 1961, May–June, v. 20, No. 5, 442–5. [Refs. in footnotes.]

Single stool specimens from a sample of 1,380 subjects of different racial groups in Honolulu and Hilo were examined by the formalin-ether concentration technique for intestinal parasites, to determine whether there was any evidence of the establishment of new infections by immigrant populations.

The overall incidence of worms and pathogenic protozoa was 12·25%, heterophyid infections being the commonest (2·98%) and almost confined to Hawaiians and Filipinos. Amoebiasis was found to have the remarkably low incidence of 0·29%.

There was no evidence of locally occurring infections with parasites of oriental origin; all infections with *Clonorchis sinensis* occurred in Chinese who either were immigrants or had at some time visited China. *W. P. Stamm*

Mühlpfordt, H. Der Einfluss tiefer Temperaturen auf Protozoen. [**The Effect of Low Temperatures on Protozoa**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 4, 481–507. [Numerous refs.]

The author gives a detailed review of work carried out on the effect upon various protozoa (especially parasitic forms) of temperatures below those normal for a given species. A table summarizes the available data regarding low-temperature (deep-freezing) preservation of many protozoa of medical and veterinary importance. There is also a long list of references. [This review does not lend itself to an abstract, but those interested in the subject, will find much useful information in the original.] *C. A. Hoare*

Bommer, W. Elektronenmikroskopische Untersuchungen an Pneumozystis carini aus menschlichen Lungen. [**Electron-Microscopic Study of *Pneumocystis carinii* from Infant Lungs**] *Deut. med. Woch.* 1961, July 7, v. 86, No. 27, 1309–13, 1328, 5 figs. on 2 pls. [10 refs.]

The English summary appended to the paper is as follows:—

"Lungs from infants who had died of interstitial plasma-cell pneumonia were examined by electron-microscopy. The findings were similar to those reported in rat pneumocystosis: the responsible organisms are at least closely related, if not identical, as they have similar form and detailed structure. Inclusions, resembling virus particles, were also seen in human material, just as in sections from experimental animals. However, proof of their virus nature is still lacking."

Meidl, F. Über den Erreger und die Laboratoriumsdiagnose der sogenannten interstitiellen plasmazellulären Säuglingspneumonie. [**The Cause and the Laboratory Diagnosis of so-called Interstitial Plasma-Cellular Infant Pneumonia**] *Zent. f. Bakt.* I. Abt. Orig. 1960, v. 180, No. 3, 281–95, 11 figs. [46 refs.]

In this review the author considers critically the available data regarding the nature of *Pneumocystis carinii*, the aetiology of the disease caused by it in infants, and the methods of its diagnosis. The parasite is regarded as a protozoon of uncertain affinities. Its presence can be readily detected post mortem by microscopical examination of the lung, whereas the only sure method for the diagnosis of the disease in the living patient is by the complement-fixation test, which is positive in up to 90% of cases examined. This test

proved to be especially valuable in the detection of atypical and latent infection among persons in contact with the patients, such as nursing personnel. When positive titres are obtained, such persons should be removed from contact with infants who are particularly susceptible to infection. *C. A. Hoare*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene.]

SOLLERS, Helen. **Global Activities concerning Mosquitoes in 1959.** *Proc. 47th Ann. Meeting New Jersey Mosquito Extermin. Ass.* 1960, Mar. 15, 16 & 17, 22–50.

This is another very readable annual survey of activities concerning mosquitoes, from the Plan Pest Control Division of the U.S. Department of Agriculture [this *Bulletin*, 1960, v. 57, 758]. The introduction refers to the investigations on the gonotrophic cycle of mosquitoes by Russian and other workers and on mosquito eradication schemes. It also includes references to scientists and others in relevant fields whom the author met in Moscow and London.

The review then covers taxonomy, distribution, techniques, biology, anatomy and physiology, and the arthropod-borne diseases encephalitis, filariasis, malaria and yellow fever [it is noted that Miss Sollers unwittingly confers on Sir Philip Manson-Bahr the Christian name of his famous father-in-law], and finally there are short sections on adulticides and larvicides, resistance and susceptibility.

This informative survey is no dry catalogue, but a lively account of investigations and incidents which reflects the author's enthusiasm for her subject. *H. J. O'D. Burke-Gaffney*

FERGUSON, Martha J.; MICKS, D. W.; JULIAN, S. R., Jr.; DUNCAN, D. **Microorganisms associated with Mosquitoes. I. Bacteria isolated from the Mid-Gut of Adult *Culex fatigans* Wiedemann** [FERGUSON & MICKS]. *J. Insect. Pathol.* New York. 1961, June, v. 3, No. 2, 112–19. [21 refs.] **II. Location and Morphology of Microorganisms in the Mid-Gut of *Culex fatigans* Wiedemann and certain other Species** [MICKS, JULIAN, FERGUSON & DUNCAN]. *Ibid.*, 120–28, 5 figs. [10 refs.]

See this *Bulletin*, 1960, v. 57, 653.

SENEVET, G. & ANDARELLI, L. Contribution à l'étude de la répartition géographique des sous-espèces, variétés ou formes de *Aedes aegypti*. [**Observations on Geographical Distribution of Subspecies, Varieties and Forms of *Aedes aegypti***] *Arch. Inst. Pasteur d'Algérie*. 1961, Mar., v. 39, No. 1, 100–102, 1 fig.

This paper contains an account of the forms of *Aedes aegypti* [this *Bulletin*, 1961, v. 58, 268] found in limited collections of this species from Algeria,

Tunisia, Martinique and French Guiana. Both dark specimens (form "*typicus*") and pale specimens (form "*queenslandensis*") are recorded from Algeria, but only dark specimens (form "*typicus*") were found in the other collections. *B. R. Laurence*

KIRKWOOD, A. **A Technique for Breeding the Laboratory Mosquito** *Aedes aegypti* **L.** *Lab. Practice.* London. 1961, May, v. 10, No. 5, 289–91. [11 refs.]

"A simple method of rearing *Aedes* larvae and adults suitable for testing insecticides is described. Standard numbers of larvae cultured in flasks of water are fed with dog biscuit. The majority will pupate on day 6 and 7 when they are transferred together into cages. A minimum handling of pupae is therefore required."

GILLETT, J. D. **Laboratory Observations on the Life-History and Ethology of** *Mansonia* **Mosquitos.** *Bull. Entom. Res.* 1961, Apr., v. 52, Pt. 1, 23–30, 1 fig. [29 refs.]

This paper contains an account of the life history of *Mansonia* (*Coquillettidia*) *aurites* and observations on the egg rafts of 6 African species of *Coquillettidia*, with a tentative key to the egg rafts of these species. The author comments on the need to consider all the characters of a species, including behaviour and life history, when considering phylogenetic relationships; he also proposes, in a plea for conformity in the use of terms for various aggregations of eggs, that the egg "rafts" of *Coquillettidia* and the egg "masses" of *Mansonioides* should be referred to collectively as egg-"clusters". *B. R. Laurence*

ASCHER, K. R. S. & NERI, Italia. **Lipoid Content and Resistance in the Housefly,** *Musca domestica* **L.** *Entomologia Exper. et Applicata.* Amsterdam. 1961, v. 4, No. 1, 7–19. [39 refs.]

There have been several investigations of possible association between high lipoid content and reduced susceptibility to insecticides. Swiss workers in the Geigy laboratories, for example, have postulated increased lipoid content in DDT-resistant house-flies as a barrier or protective storage system responsible for resistance [see WIESMANN, this *Bulletin*, 1958, v. 55, 111, and REIFF and BEYE, *ibid.*, 1960, v. 57, 1122]. The present paper describes a reinvestigation of this question. Five house-fly colonies were used: 2 Swiss (normal and highly DDT-resistant) and 3 Italian (one normal, one chlordane-resistant and one diazinon-resistant). They were normally reared on a wheat bran plus milk-powder diet.

Fat content determinations were made on the pupae and revealed significantly higher lipoid fraction in the Swiss DDT-resistant strain (thus confirming the observations of the Swiss workers). The chlordane-resistant strain was just significantly higher than the Italian normal; but significance vanished if the

Swiss strains were also included in the comparison. Measurements of iodine numbers and specific gravity of fats from pupae of different strains showed no interesting differences. The fats from the resistant strains were slightly less viscous and the fat of the resistant Swiss strain had less waxy inclusions than those of the normal Swiss flies.

To investigate possible effects of feeding larvae with adult fly fats, some fat-free larval foods were prepared. To one lot, fats from resistant flies were added and eggs from a normal strain reared on it (and *vice versa*). The addition of the adult fat did not, however, transfer resistance to flies reared on these media. In other tests large quantities of cholesterol were added to the larval diets without, however, conferring resistance.

The authors conclude that high lipoid content in flies is not a universal factor in all resistant strains. [But it occurred in the only specifically DDT-resistant one they investigated.] Secondly, they note that fat changes in the larval diet do not affect susceptibility of adult flies. *J. R. Busvine*

Saccà, G. Esperienze con mosche domestiche, sterilizzate con raggi x. [**Experiments with House-Flies sterilized by X-Rays**] *Rendiconti Istituto Superiore di Sanità*. Rome. 1961, v. 24, Pt. 1, 5–12. [11 refs.] English summary.

This investigation was suggested by a series of papers by American workers describing the eradication of the blowfly *Callitroga hominivorax* from Curaçao, by release into the field of males sterilized by gamma radiation [this *Bulletin*, 1956, v. 53, 817]. To be successful, this method of insect eradication depends on the following factors: (i) it must be possible to find a dose of gamma rays which sterilize the insects without seriously curtailing their life or vigour; (ii) the females should mate once only.

In view of the widespread insecticide resistance in house-flies, it was considered worth investigating sterile males as a control possibility. Preliminary tests by Sacca and Benetti [*Rendiconti Istituto Superiore di Sanità*, 1960, v. 23, 423; this *Bulletin*, 1961, v. 58, (142)] had shown that female house-flies normally mate only once. Experiments described in this paper showed that a dose of 3,000 roentgens to their pupae effectively sterilized male flies. Emergence was not much affected and life length not very much shortened. Normal females associating with irradiated male flies produced no viable eggs. Further tests showed that the proportion of female flies which mate twice was somewhat higher than in preliminary tests: 7 of 184 normal (3·8%) and 32 of 170 irradiated (18·8%). Nevertheless, the fertility of a mixed colony was substantially reduced by addition of sterile males. Thus, in a given period, 25 normal females, with 25 normal and 50 sterile males, produced 9 fertile and 9 sterile egg batches. When the numbers of sterile males were increased to 150, only 2 fertile and 17 sterile egg batches were laid. These results are regarded as encouraging.

[The main objection to applying this method to house-flies, mosquitoes, etc., is the difficulty of producing enough sterile males to compete with the vast numbers in a normal population. It could be more feasible with less prolific pests, such as tsetse flies.] *J. R. Busvine*

BUSVINE, J. R. & SHANAHAN, G. J. **The Resistance Spectrum of a Dieldrin-Resistant Strain of the Blowfly (*Lucilia cuprina* Wied.).** *Entomologia Exper. et Applicata.* Amsterdam. 1961, v. 4, No. 1, 1–6, 1 fig.

A dieldrin-resistant strain of the blowfly (*Lucilia cuprina*) from Australia was shown by a topical application technique to be resistant to gamma BHC, endrin, isodrin, beta-chlordane, dieldrin and aldrin in this order of ascending degree of resistance ; it continues to be susceptible to DDT. In this respect the resistance spectrum resembles very closely that found in *Pediculus humanus, Cimex lectularius, Anopheles gambiae* and *Musca domestica.* *G. Davidson*

ABBASSIAN-LINTZEN, Rosemarie. **Tabanidae (Diptera) of Iran. VI. Records of Horseflies from Southeast Iran (Iranian Baluchistan and the Jiroft Area). Description of *Tabanus kermani* n.sp. and *Tabanus leclercqi* n.sp.** *Bull. Soc. Path. Exot.* 1961, Jan.–Feb., v. 54, No. 1, 128–47, 5 figs. (2 on pl.) [18 refs.]

DUBOIS, K. P. **Potentiation of the Toxicity of Organophosphorus Compounds.** *Advances in Pest Control Res.* 1961, v. 4, 117–51, 3 figs. [13 refs.]

SPILLER, D. **A Digest of Available Information on the Insecticide Malathion.** *Advances in Pest Control Res.* 1961, v. 4, 249–335. [658 refs.]

O'BRIEN, R. D. **Selective Toxicity of Insecticides.** *Advances in Pest Control Res.* 1961, v. 4, 75–116, 3 figs. [97 refs.]

REPORTS AND SURVEYS

BAGCHI, S. C. & PRASAD, B. G. **General Health Survey in a Group of Villages in Rural Health Centre, Sarojini Nagar, Lucknow.** *J. Indian Med. Ass.* 1961, Apr. 16, v. 36, No. 8, 348–53.

A health survey was carried out in a community development block near Lucknow. A random sample was investigated in each of 4 villages, comprising

a total of 164 families and 862 persons. It was a rural population with 71% dependent on agriculture and 26% literate. Standards of environmental sanitation were low. The economic level was low and 79% of expenditure was on food which was deficient in protein, fats, calcium and vitamins A and C. Among other vital statistics given concerning fertility and child survival was a birth rate of 40·6 per 1,000.

Morbidity was assessed on whether the individual felt able to do his normal work. At the time of the survey 16·9% were ill (3·3% acutely, 10·2% chronically and 3·3% in indifferent health). Morbidity incidence in males was 11·7% compared with 5·2% in females, and 57% was in those over 20 years. The commonest causes of sickness were respiratory infections (bronchitis and tuberculosis) followed by deficiency states. Sickness incidence was greatest (76%) in illiterates and newly literate persons, and also in those with annual incomes of 450 rupees or less. Only 36% of those found to be sick at the survey had been to the health centre or a private practitioner. During the previous 12 months 37·2% of the population had one or more sickness, their average annual period off duty being 30 days. Of 574 persons whose stools were examined 58·4 showed intestinal parasites, 38·9% being males and 19·5% females. Ancylostomes provided 51% of these infections and *Ascaris* 3·6%. Of 352 night bloods examined 14·2% revealed *Wuchereria bancrofti*.

The crude death rate was 39·4 and infant mortality was 189·1. The causes of death are tabulated according to age and sex, the main causes being smallpox and tuberculosis, each of which was responsible for 6·9 per 1,000 deaths. Infectious and parasitic diseases, anaemia, cholera and pneumonia followed with rates varying from 4·64 to 2·32. In spite of the existence of a health centre only 4% of expectant mothers had ante-natal care and 73% were delivered by untrained midwives.

[It is impossible to condense all the valuable information given in this interesting paper which should be read by those studying health data from tropical areas.]

[See also this *Bulletin*, 1961, v. 58, 155.] *T. H. Davey*

MUKHERJI, P. S. & SENGUPTA, S. K. **Health Status of School Children in Urban West Bengal.** *Indian J. Pub. Health*. 1960, Oct., v. 4, No. 4, 187–93.

Medical examinations of 1,582 pupils (801 male and 781 female) were made at six schools in two wards of Calcutta. The ages ranged from 4 to 16 years, the majority being between 8 and 13 years. The general nutritional state was good in 7·6%, fair in 66·6% and poor in 25·7%. Vaccination scars were present in 99.6% and smallpox scars in only 0·4%.

Health defects of some kind were present in 82·8% and multiple defects in 61·7%, the average number of defects per child being 2·1. Respiratory troubles were most common (49·9%) and consisted of enlarged tonsils (34·0%), chronic nasal catarrh (7·8%) and chronic bronchitis (3·7%). Gastro-intestinal disorders were present in 43·7%, were most common in younger children and were mainly diarrhoea and worm infections. Deficiency of riboflavine was noted in 7·4%, of vitamin A in 5·6% (mostly in younger children), of vitamin C probably in 6·5% and of vitamin D probably in only 3 children (0·2%). Anaemia, microcytic hypochromic, was present in 11·2% and more commonly in girls.

Enlarged lymph glands were noted in 30·5%, probably mainly due to infected tonsils. Caries of the teeth occurred in 21·2%, mostly in children under 12 years of age. Eye complaints were observed in 10·9%, 7·2% having defective vision; trachoma was absent. Skin diseases, mostly scabies, were common in pre-school children. Pyorrhoea and tartar, due to failure to brush teeth, were present in 3·6%. Chronic otorrhoea was found in 2·7% but hearing was defective in only 8 children. Phimosis was present in 4·7% of male children. Mental abnormalities and speech defects were uncommon. The liver was enlarged in 2·2% and the spleen in only 0·25%. Joint pains were reported by 1·4% but rheumatic heart disease was not seen.

The average age of the commencement of menstruation of 401 girls between 11 and 16 years was 12·7 years, and of those menstruating 19 (16·6%) suffered dysmenorrhoea. *T. H. Davey*

STAHLIE, T. D. **Some Aspects of Child Health in Thailand.** *J. Trop. Med. & Hyg.* 1961, Apr., v. 64, No. 4, 79–87, 5 figs. [12 refs.]

This is an account of surveys made in 1957 and 1958 of 7 representative samples of Thai children; 6 from typical rural communities, and 1 from a crowded part of Bangkok city. The samples comprised from 172–478 children who all belonged to the lower income classes. Related information was obtained from records of the Bangkok midwifery school and of midwives.

The mean birth weights at the Bangkok midwifery school of 380 boys and 370 girls were respectively 3,208 gm. and 3,137·1 gm. These are some 400 gm. higher than weights recorded in Rangoon. The Bangkok birth weights are tending to increase; published records give mean birth weights at various institutions as 1930—2,901 gm., 1952—3,068 gm., 1951 to 1956—3,068·4 gm., 1955—3,156 gm. It is believed that this increase may be due to improved maternal nutrition.

Birth weights in rural areas were investigated by an analysis of bi-monthly reports made by 1,000 government midwives. The percentage distributions of mean birth weights for each sex, in 9 different regions, are shown in histograms. Considerable differences in these distributions are difficult to explain on ethnic grounds, but they have suggestive relationships with food production and nutritional state in the respective regions.

9·1% of 1,008 randomly selected records of liveborn children in the Bangkok Midwifery School were premature by the conventional international standard (birth weight = 2,500 gm. or less), significantly more being born to primiparae than to multiparae. 11·3% of these 97 children died, but only 5 out of 82 of those weighing 1,751–2,500 gm. at birth. This low mortality suggests that the conventional weight level for prematurity may not always be related to physiological prematurity. 10·7% of boys and 12·5% of girls were reported by the midwives as premature by weight, but only 1·6% of the sample of 2,364 children investigated were said to have been born after a pregnancy of less than 9 lunar months. Short gestation in Thailand appears to be associated with birth weights of 2,000 gm. or less.

There were differences between Bangkok city and the rural areas in methods of infant feeding. 1·8% of the newborn in rural areas, and 7·4% in Bangkok received no breast-feeding; from the first day onwards 5·3% of rural babies and

13·3% of Bangkok babies received supplementary cow's milk—sweetened condensed milk or powdered milk; of rural babies 90% were breast-fed at 9 months, and over 50% at 15 months; in Bangkok there were 66% at 9 months and 16% at 15 months; the time limit for all breast-feeding was reached at 30–42 months in rural areas, and at 24 months in Bangkok. These differences are attributed to the socio-economic factors of urbanization, many city mothers being employed in shops and offices. 83% of 387 babies aged up to 9 months who received no other milk but breast milk, and no other protein-rich supplement, showed no signs of under-nutrition, and it was assumed that they received adequate supplies from the breast.

In surveyed samples, 10% received solid food in the first week and 40% at one month of age. These supplements are at first rice and banana, but later may contain vegetable soup, egg yolk, meat broth and other fruits. The bananas contain 40 μgm. thiamine per 100 gm. edible portion, and this may be a factor in preventing beriberi, which is rare in children (2 out of 2,270) but reported as common in pregnancy and lactation (10%).

A simple classification of "good", "fair", "borderline" and "poor" was used satisfactorily by relatively unskilled workers after a week of training, to evaluate the general health of the sample children on clinical examination. "Borderline" children showed minor signs of under- and malnutrition or of chronic infection; "poor" children were acutely or chronically ill, and included those with major signs of malnutrition. Over three-quarters were "good" or "fair", over one-fifth were "borderline" and about 1% were poor. Two-thirds of the "poor" children needed hospital treatment. The "borderline" children were the group needing specific assistance from preventive services; mostly their condition was due to inadequate nutrition. Good nutrition was not related to family prosperity; there was a tendency for wealth to be spent on luxuries rather than good food.

Height and weight were measured after the children had been assessed and classified. The mean heights and weights for age of "good" children were greater than those of "fair" which were greater than "borderline" children. It is concluded that standard growth curves should only be derived from children in unexceptionable condition.

Mean haemoglobin levels at ages 1–48 months ranged from 11·00–11·77 gm./100 ml. in "good" and "fair" children and from 9·67–11·32 gm./100 ml. in "borderline" children; 21·9% of all children had less than 10 gm./100 ml., and 1·2% had severe anaemia with less than 8 gm./100 ml.

Intestinal parasitism was common, but showed considerable variation in incidence from place to place. *T. P. Eddy*

LUYKEN, R. & LUYKEN-KONING, F. W. M. **Studies on the Physiology of Nutrition in Surinam. IV. Nitrogen Balance Studies.** *Trop. & Geograph Med.* Amsterdam. 1960, Dec., v. 12, No. 4, 303–7. [14 refs.] **V. Amylase, Lipase and Cholinesterase Activity of the Serum of Diverse Population Groups.** *Ibid.*, 308–12. [41 refs.] **VI. Cholesterol Content of the Blood Serum.** *Ibid.*, 313–14.

These are reports forming part of a series of investigations sponsored by the Foundation for Scientific Research in Surinam and the Antilles.

The first concerns nitrogen balances in 7 Bushnegro children, 11 Javanese children and 1 East Indian boy. All were given a diet which corresponded to the food they received in their homes. Thus the Bushnegro children received for breakfast and in the evening Cassava-bread with peanut butter or a small quantity of fish or shrimps. At noon they had rice with some vegetables and fish or meat. The other children had bread with butter and jam in the morning and rice with vegetables and a little fish for lunch and supper. Meat was provided only once or twice a week.

This diet showed in the first group 4·7 gm. and in the second 6·2 gm. of nitrogen per day of which about 10% was of animal origin. The first group retained 0·82 gm. and the second 1·26 gm. on the average. This was considered sufficient.

Serum amylase, lipase and pseudocholinesterase were measured in a number of different racial groups. The amylase activity of the serum was lower in resident Europeans than in Bushnegroes and Javanese. The lipase level was lower in the Bushnegroes than in Javanese, American Indians and Europeans. The pseudocholinesterase activity was higher in the Javanese and American Indians than in the Europeans, and was lower in the Bushnegroes. The authors suggest that these differences may be due to an adaptation to the composition of the diet. Thus the Bushnegroes eat much carbohydrate and little fat and the Javanese have a high fat content in their diet which might stimulate lipase production.

The serum cholesterol was higher in Europeans and Javanese and much lower in Bushnegroes and American Indians. It was noteworthy that among the Javanese the women had a higher cholesterol level than the men. These points are shown in the following table:

Average Cholesterol in mgm. per 100 ml. Serum

Group	*Number*	*mgm. of Cholesterol*
Bushnegroes♂	74	142
Bushnegroes♀	35	155
Javanese♂	74	164
Javanese♀	31	202
American Indians♂	33	151
American Indians♀		
Europeans♂	16	221
Europeans♀	11	220

H. Lehmann

BOOK REVIEWS

DIXON, H. B. F. [M.C., M.D., F.R.C.P.] & LIPSCOMB, F. M. [O.B.E., F.R.C.P.]. **Cysticercosis: An Analysis and Follow-up of 450 Cases.** *Med. Res. Council Spec. Rep. Ser. No. 299.* pp. vi+58, 4 figs. 1961. London: H.M. Stationery Office. [6s. 6d.]

This Report gives details of a close study and a follow-up of 450 cases of cysticercosis, mainly in British soldiers who had served in India. The authors also have records of over a hundred strongly suspected cases, but not proved up to 1957. [The reviewer has always believed that the number of cases of this disease that are "missed" because of incomplete investigation and follow-up, together with those where proof is impossible during the subject's life, exceeds the number detected by one or other method of diagnosis; and for a necropsy to have any real significance, the performer must have the disease in mind, and be familiar with cysticercal parasites in their varied stages of development and degeneration.]

As it was usually impossible to fix the exact date of infection, the authors arbitrarily selected this as the midpoint of the subjects' service in India. On this basis, symptoms began within 7 years in 83% of patients, extreme limits being a few months and 30 years. In 21·6% there was a history of intestinal taeniasis.

Of neurological disorders, epilepsy was outstanding; it occurred in 92% of patients, and was the only symptom in 31%. It was the first symptom in 76% of the series. In general, these attacks are indistinguishable from "idiopathic" epilepsy, but a tendency towards variation in the pattern of the fits is sometimes evident. The commonest causes of death were status epilepticus and intracranial hypertension.

The sign most useful in diagnosis is the appearance of subcuticular nodules, each caused by the death of a parasite with consequent increased tension within the cyst wall—thus providing material for biopsy. Of the present series, nodules were recorded in 54%. As the individual larvae tend to die off gradually, "new" cysts may become apparent over periods of many years. Calcification of larvae in skeletal muscles was detected in 97% of 402 patients examined by X-ray or at necropsy 5 years or more after the assumed date of infection. As calcification (which does not take place in every larva) is the final stage of post-mortem degeneration in the larva concerned, it can be detected only in a parasite that has been dead for several years; so that negative skiagrams taken within the first 5 years carry little weight. Three patients in the series became radiologically positive after having been persistently negative for 19 years.

Intracranial calcification occurs more rarely, and a negative skiagram taken within 10 years of infection has little significance. The authors found, however, that in patients subjected to a long-term follow-up beyond—sometimes far beyond—the 10-year period, intracranial calcification was detected in some 36% of cases. In 4 such instances, conversion from previously negative to positive skiagrams took place between 11 and 16 years, 13 and 14 years, 22 and 25 years, and 25 and 31 years.

The authors point out, rightly, that in the past the main impediment to the diagnosis of cysticercosis was failure to think of this disease. In the reviewer's

experience the main impediment today is the belief that a single negative skiagram of the brain is sufficient to exclude it.

For reasons of space, it is possible to mention here only a few points from this excellent survey, one which will repay widespread and thoughtful study.

W. P. MacArthur

WILLIAMS, Robert R. **Towards the Conquest of Beriberi.** pp. xxii + 338, frontispiece, 10 figs. on 5 pls. & 11 text figs. 1961. Cambridge: Harvard University Press, U.S.A. London: Oxford University Press, Amen House, Warwick Square, E.C.4. [60s.]

Modern medical science has made it possible to eliminate beriberi as a major disease in all the large towns in the rice-eating areas of the tropics. Unfortunately there has been no similar success in rural areas and, indeed, in some parts of the tropics there is evidence that the disease is actually spreading. A book with this title is therefore particularly apt at the moment. Dr. R. R. Williams is in many ways well qualified to write it. He was born and brought up in the Telegu speaking area of India, where beriberi was and still is endemic. From 1910 to 1915 he worked with Vedder in Manila. Then for 20 years, while working as a chemist in the U.S.A., he played a leading role in the international efforts which led to isolation and synthesis of the vitamin thiamine, which has such a spectacular therapeutic effect on the acute forms of the disease. Subsequently in the Philippines and throughout the East he has been a leading protagonist in the prevention of beriberi by the fortification of rice with vitamins.

The book is divided into three parts. The first deals with "Beriberi as a Deficiency Disease". This is a competent and interesting account of the history and clinical features of the disease. Dr. Williams is not a medical man, but he has wisely drawn heavily on the writings of Vedder, who had a unique clinical experience of the disease and whose book *Beriberi* published in 1913 remains the standard clinical text. He has also used extensively the records of Professor Cruickshank, made when he was a prisoner of the Japanese at Changi gaol in Singapore. The medical writing is thus orthodox and sensible.

Part II is on "The Chemistry of Thiamine and its Biochemical Action". Here Dr. Williams is writing as an expert who has made many contributions to the subject. His account is clear and admirably presented with all the authority that comes only from many years of hard work on the subject.

Part III is on "Practical Application of Findings" and is concerned essentially with the prevention of the disease. Dr. Williams is well known as an advocate of fortification of rice by thiamine and other vitamins, a policy based on experiments in the Philippines carried out soon after the Second World War. Much of this is special pleading, for Dr. Williams has so far failed to impress most European and Asiatic scientists and also U.N. expert committees of the value of this approach. Here he states the case for fortification strongly, but hardly without bias, and he does less than justice to the views of his opponents. To the reviewer it seems that in this argument neither side has properly appreciated their opponents. There can be no doubt that Dr. Williams is justified in his claim that the fortification of rice is a useful public health measure under certain circumstances, especially in large towns and for rations for armed

services and large labour forces and in times of emergency. However, its value in rural areas is much less certain and, in as much as a policy of fortification may distract from other measures to prevent the disease, notably by an all-round improvement in the diet resulting from better agriculture and improved health education, fortification may even be harmful. Dr. Williams also seems at times to forget that beriberi is a disease caused by a poor, ill-balanced diet, in which deficiency of thiamine is only one (albeit the most important) of many factors. He is however very careful to make this point clear in Part I. The reviewer would hope that this controversy might die down and that fortification of rice might be generally accepted, not as a panacea against beriberi in all circumstances, but as one of several useful measures, especially valuable when large groups of people are living under circumstances when the beriberi is likely to break out.

An attractive style, with many personal reminiscences and pleasing digressions, makes the book very readable. Nearly 1,000 references to all aspects of the subject show that it is a work of scholarship. The monograph can be recommended to public health workers, clinicians and chemists in the rice-eating areas of the world. They will find much to stimulate and interest them, even if they need not agree with all the author's views. *R. Passmore*

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